Universal Slice Applicator

Customer Product Manual
Part 106228B02
Issued 5/07

This equipment is regulated by the European Union under WEEE Directive 2002/96/EC).

See www.nordson.com for information about how to properly dispose of this equipment.

NORDSON CORPORATION • DAWSONVILLE, GEORGIA • USA
www.nordson.com

CE

Nordson Corporation welcomes requests for information, comments and inquiries about its products.
General information about Nordson can be found on the Internet using the following address:
http://www.nordson.com.

Address all correspondence to:

Nordson Corporation
Attn: Nonwovens Marketing Department
12 Nordson Drive
Dawsonville, GA 30534

Notice

Trademarks

Part 1062228B02

Table of Contents

Section 1
Safety

Read this section before using the equipment. This section contains recommendations and practices applicable to the safe installation, operation, and maintenance (hereafter referred to as “use”) of the product described in this document (hereafter referred to as “equipment”). Additional safety information, in the form of task-specific safety alert messages, appears as appropriate throughout this document.

WARNING: Failure to follow the safety messages, recommendations, and hazard avoidance procedures provided in this document can result in personal injury, including death, or damage to equipment or property.

Safety Alert Symbols

The following safety alert symbol and signal words are used throughout this document to alert the reader to personal safety hazards or to identify conditions that may result in damage to equipment or property. Comply with all safety information that follows the signal word.

WARNING: Indicates a potentially hazardous situation that, if not avoided, can result in serious personal injury, including death.

CAUTION: Indicates a potentially hazardous situation that, if not avoided, can result in minor or moderate personal injury.

CAUTION: (Used without the safety alert symbol) Indicates a potentially hazardous situation that, if not avoided, can result in damage to equipment or property.

Responsibilities of the Equipment Owner

Equipment owners are responsible for managing safety information, ensuring that all instructions and regulatory requirements for use of the equipment are met, and for qualifying all potential users.

Safety Information

- Research and evaluate safety information from all applicable sources, including the owner-specific safety policy, best industry practices, governing regulations, material manufacturer's product information, and this document.
- Make safety information available to equipment users in accordance with governing regulations. Contact the authority having jurisdiction for information.
- Maintain safety information, including the safety labels affixed to the equipment, in readable condition.

Instructions, Requirements, and Standards

- Ensure that the equipment is used in accordance with the information provided in this document, governing codes and regulations, and best industry practices.
- If applicable, receive approval from your facility's engineering or safety department, or other similar function within your organization, before installing or operating the equipment for the first time.
- Provide appropriate emergency and first aid equipment.
- Conduct safety inspections to ensure required practices are being followed.
- Re-evaluate safety practices and procedures whenever changes are made to the process or equipment.

User Qualifications

Equipment owners are responsible for ensuring that users:

- receive safety training appropriate to their job function as directed by governing regulations and best industry practices
- are familiar with the equipment owner's safety and accident prevention policies and procedures
- receive, equipment- and task-specific training from another qualified individual

  NOTE: Nordson can provide equipment-specific installation, operation, and maintenance training. Contact your Nordson representative for information

- possess industry- and trade-specific skills and a level of experience appropriate to their job function
- are physically capable of performing their job function and are not under the influence of any substance that degrades their mental capacity or physical capabilities

Applicable Industry Safety Practices

The following safety practices apply to the use of the equipment in the manner described in this document. The information provided here is not meant to include all possible safety practices, but represents the best safety practices for equipment of similar hazard potential used in similar industries.

Intended Use of the Equipment

- Use the equipment only for the purposes described and within the limits specified in this document.
- Do not modify the equipment.
- Do not use incompatible materials or unapproved auxiliary devices. Contact your Nordson representative if you have any questions on material compatibility or the use of non-standard auxiliary devices.

Instructions and Safety Messages

- Read and follow the instructions provided in this document and other referenced documents.
- Familiarize yourself with the location and meaning of the safety warning labels and tags affixed to the equipment. Refer to *Safety Labels and Tags* at the end of this section.
- If you are unsure of how to use the equipment, contact your Nordson representative for assistance.

Installation Practices

- Install the equipment in accordance with the instructions provided in this document and in the documentation provided with auxiliary devices.
- Ensure that the equipment is rated for the environment in which it will be used and that the processing characteristics of the material will not create a hazardous environment. Refer to the Material Safety Data Sheet (MSDS) for the material.
- If the required installation configuration does not match the installation instructions, contact your Nordson representative for assistance.
- Position the equipment for safe operation. Observe the requirements for clearance between the equipment and other objects.
- Install lockable power disconnects to isolate the equipment and all independently powered auxiliary devices from their power sources.
- Properly ground all equipment. Contact your local building code enforcement agency for specific requirements.
- Ensure that fuses of the correct type and rating are installed in fused equipment.
- Contact the authority having jurisdiction to determine the requirement for installation permits or inspections.

Operating Practices

- Familiarize yourself with the location and operation of all safety devices and indicators.
- Confirm that the equipment, including all safety devices (guards, interlocks, etc.), is in good working order and that the required environmental conditions exist.
- Use the personal protective equipment (PPE) specified for each task. Refer to *Equipment Safety Information* or the material manufacturer's instructions and MSDS for PPE requirements.
- Do not use equipment that is malfunctioning or shows signs of a potential malfunction.

Maintenance and Repair Practices

- Perform scheduled maintenance activities at the intervals described in this document.
- Relieve system hydraulic and pneumatic pressure before servicing the equipment.
- De-energize the equipment and all auxiliary devices before servicing the equipment.
- Use only new factory-authorized refurbished or replacement parts.
- Read and comply with the manufacturer's instructions and the MSDS supplied with equipment cleaning compounds.

  NOTE: MSDSs for cleaning compounds that are sold by Nordson are available at www.nordson.com or by calling your Nordson representative.

- Confirm the correct operation of all safety devices before placing the equipment back into operation.
- Dispose of waste cleaning compounds and residual process materials according to governing regulations. Refer to the applicable MSDS or contact the authority having jurisdiction for information.
- Keep equipment safety warning labels clean. Replace worn or damaged labels.

Equipment Safety Information

This equipment safety information is applicable to the following types of Nordson equipment:

- hot melt and cold adhesive application equipment and all related accessories
- pattern controllers, timers, detection and verification systems, and all other optional process control devices

Equipment Shutdown

To safely complete many of the procedures described in this document, the equipment must first be shut down. The level of shut down required varies by the type of equipment in use and the procedure being completed. If required, shut down instructions are specified at the start of the procedure. The levels of shut down are:

Relieving System Hydraulic Pressure

Completely relieve system hydraulic pressure before breaking any hydraulic connection or seal. Refer to the melter-specific product manual for instructions on relieving system hydraulic pressure.

De-energizing the System

Isolate the system (melter, hoses, guns, and optional devices) from all power sources before accessing any unprotected high-voltage wiring or connection point.

1. Turn off the equipment and all auxiliary devices connected to the equipment (system).
2. To prevent the equipment from being accidentally energized, lock and tag the disconnect switch(es) or circuit breaker(s) that provide input electrical power to the equipment and optional devices.

   NOTE: Government regulations and industry standards dictate specific requirements for the isolation of hazardous energy sources. Refer to the appropriate regulation or standard.

Disabling the Guns

All electrical or mechanical devices that provide an activation signal to the guns, gun solenoid valve(s), or the melter pump must be disabled before work can be performed on or around a gun that is connected to a pressurized system.

1. Turn off or disconnect the gun triggering device (pattern controller, timer, PLC, etc.).
2. Disconnect the input signal wiring to the gun solenoid valve(s).
3. Reduce the air pressure to the gun solenoid valve(s) to zero; then relieve the residual air pressure between the regulator and the gun.

General Safety Warnings and Cautions

Table 1-1 contains the general safety warnings and cautions that apply to Nordson hot melt and cold adhesive equipment. Review the table and carefully read all of the warnings or cautions that apply to the type of equipment described in this manual.

Equipment types are designated in Table 1-1 as follows:

HM = Hot melt (melters, hoses, guns, etc.)

PC = Process control

CA = Cold adhesive (dispensing pumps, pressurized container, and guns)

Table 1-1 General Safety Warnings and Cautions

Equipment Type	Warning or Caution
HM	**WARNING:** Hazardous vapors! Before processing any polyurethane reactive (PUR) hot melt or solvent-based material through a compatible Nordson melter, read and comply with the material's MSDS. Ensure that the material's processing temperature and flashpoints will not be exceeded and that all requirements for safe handling, ventilation, first aid, and personal protective equipment are met. Failure to comply with MSDS requirements can cause personal injury, including death.
HM	**WARNING:** Reactive material! Never clean any aluminum component or flush Nordson equipment with halogenated hydrocarbon fluids. Nordson melters and guns contain aluminum components that may react violently with halogenated hydrocarbons. The use of halogenated hydrocarbon compounds in Nordson equipment can cause personal injury, including death.
HM, CA	**WARNING:** System pressurized! Relieve system hydraulic pressure before breaking any hydraulic connection or seal. Failure to relieve the system hydraulic pressure can result in the uncontrolled release of hot melt or cold adhesive, causing personal injury.
HM	**WARNING:** Molten material! Wear eye or face protection, clothing that protects exposed skin, and heat-protective gloves when servicing equipment that contains molten hot melt. Even when solidified, hot melt can still cause burns. Failure to wear appropriate personal protective equipment can result in personal injury.

Continued...

General Safety Warnings and Cautions *(contd)*

Table 1-1 General Safety Warnings and Cautions *(contd)*

Equipment Type	Warning or Caution
HM, PC	**WARNING:** Equipment starts automatically! Remote triggering devices are used to control automatic hot melt guns. Before working on or near an operating gun, disable the gun's triggering device and remove the air supply to the gun's solenoid valve(s). Failure to disable the gun's triggering device and remove the supply of air to the solenoid valve(s) can result in personal injury.
HM, CA, PC	**WARNING:** Risk of electrocution! Even when switched off and electrically isolated at the disconnect switch or circuit breaker, the equipment may still be connected to energized auxiliary devices. De-energize and electrically isolate all auxiliary devices before servicing the equipment. Failure to properly isolate electrical power to auxiliary equipment before servicing the equipment can result in personal injury, including death.
HM. CA, PC	**WARNING:** Risk of fire or explosion! Nordson adhesive equipment is not rated for use in explosive environments and should not be used with solvent-based adhesives that can create an explosive atmosphere when processed. Refer to the MSDS for the adhesive to determine its processing characteristics and limitations. The use of incompatible solvent-based adhesives or the improper processing of solvent-based adhesives can result in personal injury, including death.
HM, CA, PC	**WARNING:** Allow only personnel with appropriate training and experience to operate or service the equipment. The use of untrained or inexperienced personnel to operate or service the equipment can result in injury, including death, to themselves and others and can damage the equipment.

Continued...

Equipment Type	Warning or Caution
HM	 **CAUTION:** Hot surfaces! Avoid contact with the hot metal surfaces of guns, hoses, and certain components of the melter. If contact can not be avoided, wear heat-protective gloves and clothing when working around heated equipment. Failure to avoid contact with hot metal surfaces can result in personal injury.
HM	**CAUTION:** Some Nordson melters are specifically designed to process polyurethane reactive (PUR) hot melt. Attempting to process PUR in equipment not specifically designed for this purpose can damage the equipment and cause premature reaction of the hot melt. If you are unsure of the equipment's ability to process PUR, contact your Nordson representative for assistance.
HM, CA	**CAUTION:** Before using any cleaning or flushing compound on or in the equipment, read and comply with the manufacturer's instructions and the MSDS supplied with the compound. Some cleaning compounds can react unpredictably with hot melt or cold adhesive, resulting in damage to the equipment.
HM	**CAUTION:** Nordson hot melt equipment is factory tested with Nordson Type R fluid that contains polyester adipate plasticizer. Certain hot melt materials can react with Type R fluid and form a solid gum that can clog the equipment. Before using the equipment, confirm that the hot melt is compatible with Type R fluid.

Other Safety Precautions

- Do not use an open flame to heat hot melt system components.
- Check high pressure hoses daily for signs of excessive wear, damage, or leaks.
- Never point a dispensing handgun at yourself or others.
- Suspend dispensing handguns by their proper suspension point.

First Aid

If molten hot melt comes in contact with your skin:

1. Do NOT attempt to remove the molten hot melt from your skin.
2. Immediately soak the affected area in clean, cold water until the hot melt a has cooled.
3. Do NOT attempt to remove the solidified hot melt from your skin.
4. In case of severe burns, treat for shock.
5. Seek expert medical attention immediately. Give the MSDS for the hot melt to the medical personnel providing treatment.

Safety Labels and Tags

Contact your Nordson representative for information about the safety labels and tags on the equipment.

Section 2
Description

Introduction

The Universal slice metering applicator is designed to apply thermoplastic hot melt adhesive to nonwoven products. Universal slice applicators are configurable, which means each applicator is constructed according to specific choices made during the ordering process. Reference drawings specific to your applicator are provided with this manual.

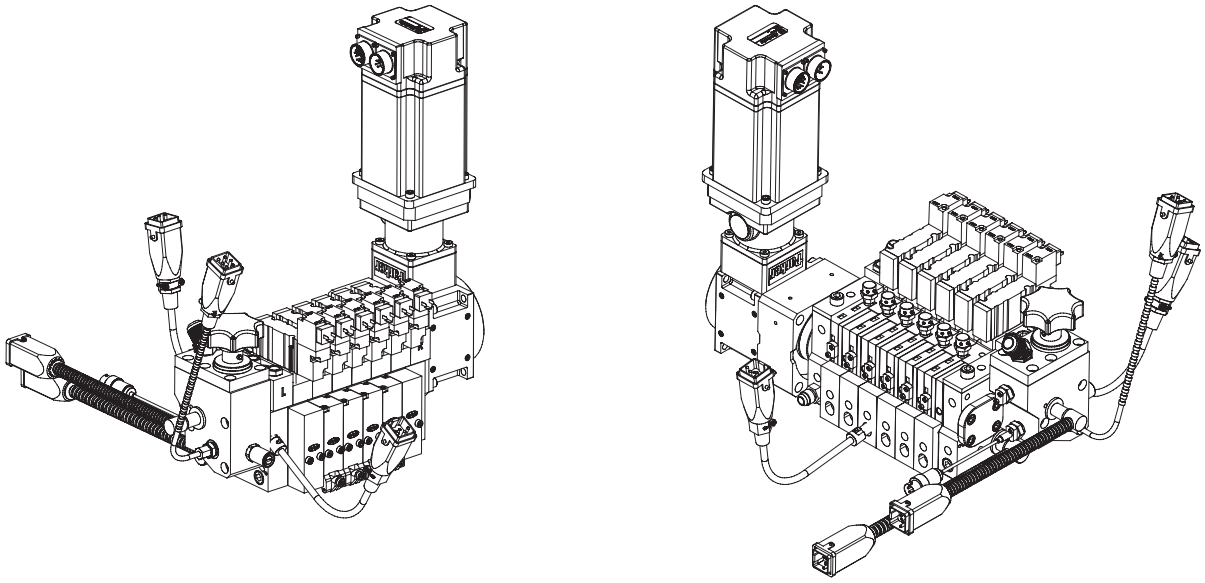


Figure 2-1 Typical Universal slice applicator (front and back views of a five-slice applicator with a right-angle drive shown)

Key Parts

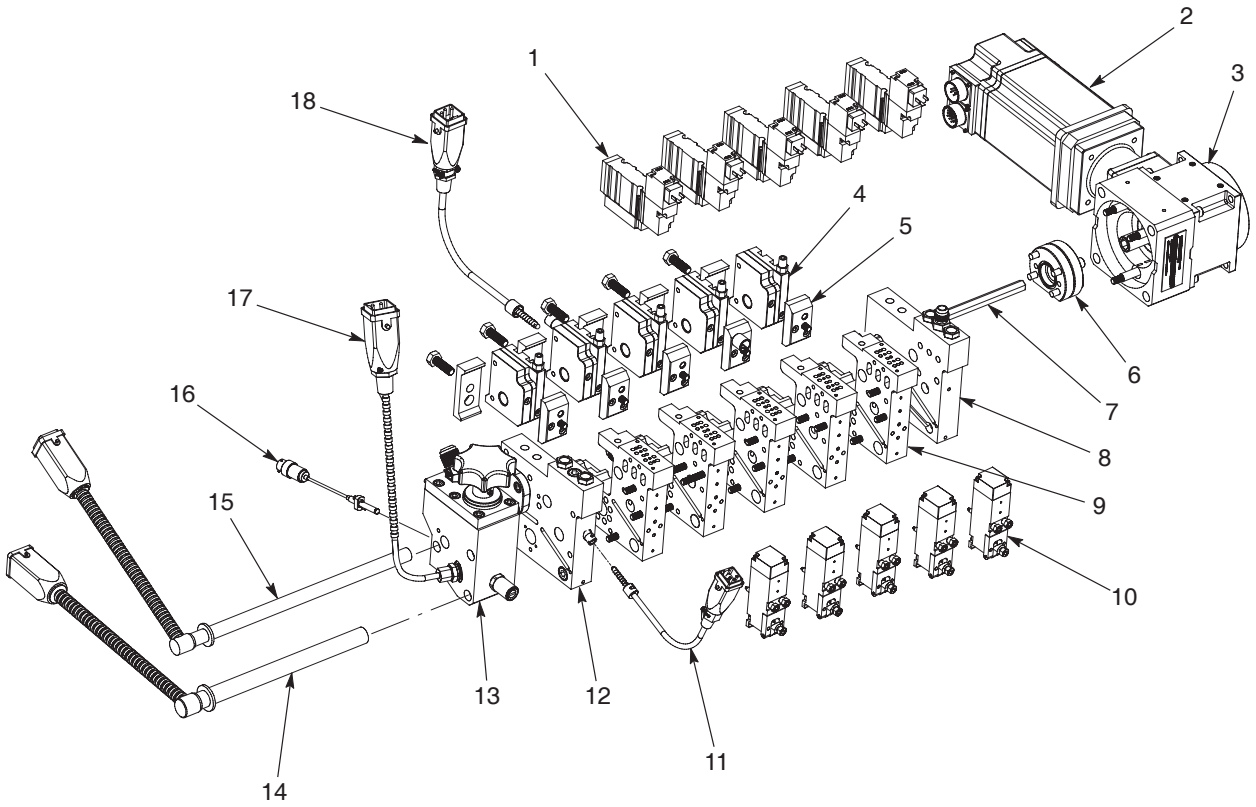


Figure 2-2 Key parts of a Universal slice applicator (five-slice applicator with right-angle drive shown)

1. Solenoid valve
2. Motor
3. Reducer
4. Pump
5. Adhesive diverter plate
6. Pump packing
7. Pump shaft
8. End slice (right)
9. Middle slice (one of five)
10. Dispensing module
11. Adhesive temperature sensor
12. End slice (left)
13. Filter block
14. Air heater
15. Adhesive heater
16. Miniature pressure transducer (option)
17. Immersion sensor (option)
18. Air temperature sensor

Note: The front of the applicator is always the side on which the modules are installed.

Note: The optional pump temperature sensor is not shown.

Theory of Operation

Operation of the Universal slice applicator begins with the introduction of three process variables: melted adhesive, module-actuating air, and heated pattern air. Figure 2-3 shows the flow of adhesive and air through the applicator.

Melted adhesive flows from the melter through a single supply hose to the adhesive inlet on the filter block. The adhesive then flows through the manifold slices to the dispensing modules. Solenoid valves supply actuating air to the modules, allowing adhesive to flow into the nozzles or dies installed on the modules. Heated pattern air may also be supplied to the applicator, causing the adhesive exiting the nozzles or dies to produce a spray pattern. When a module is closed, adhesive is recirculated back through the pump.

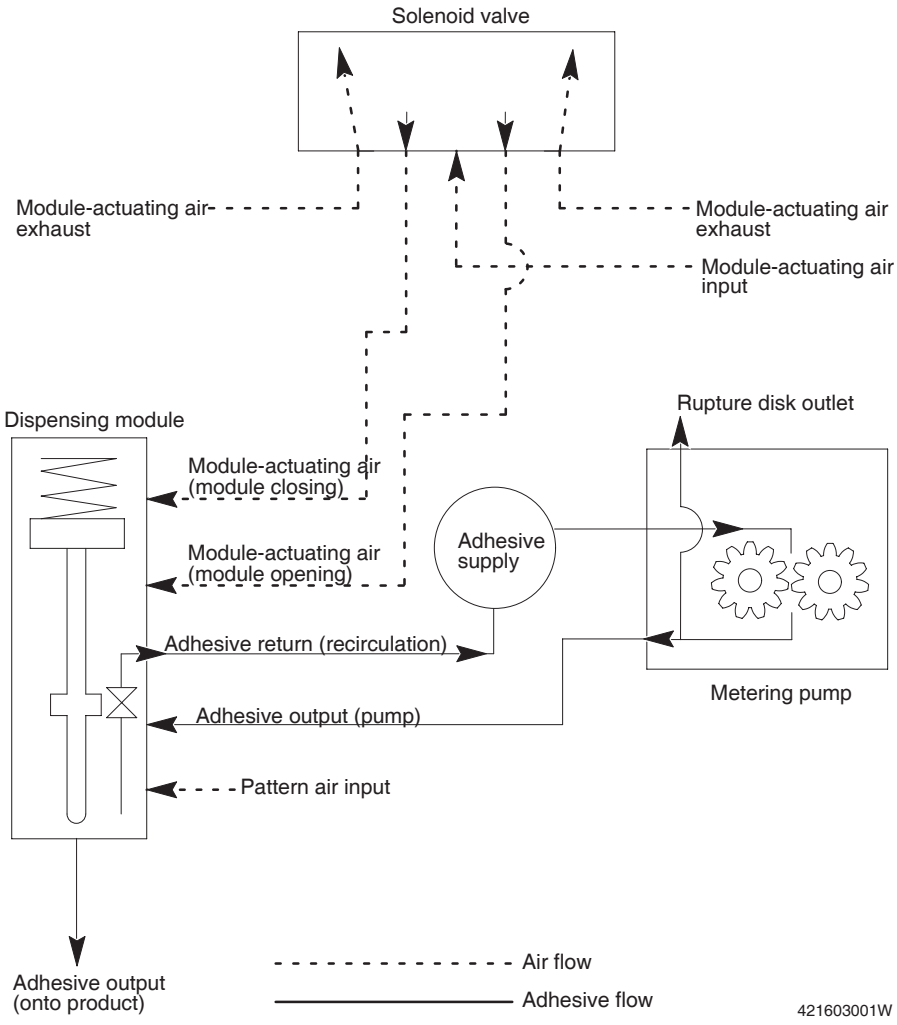


Figure 2-3 Flow of adhesive and air through a slice applicator

Major Assemblies

The applicator consists of the following major assemblies:

- a customer-specified number of manifold “slices” onto which a metering pump, adhesive diverter plate, dispensing module, and solenoid valve may be mounted. The manifold slices are flanked by end slices.
- a filter block assembly
- a motor, reducer, and shaft assembly to drive the metering pumps

Manifold Slices

The applicator manifold is composed of 25-mm (0.984 in.) left-end and right-end slices along with however many 25-mm (0.984 in.) manifold slices are specified by the customer.

Mounted on each manifold slice are the following components that, depending on their configuration, affect the flow of adhesive and air through the slice:

- pump
- dispensing module
- solenoid valve and heat isolation gasket assembly or block-off plate
- adhesive diverter plate

Figures 2-4 and 2-5 show the components typically mounted on a manifold slice.

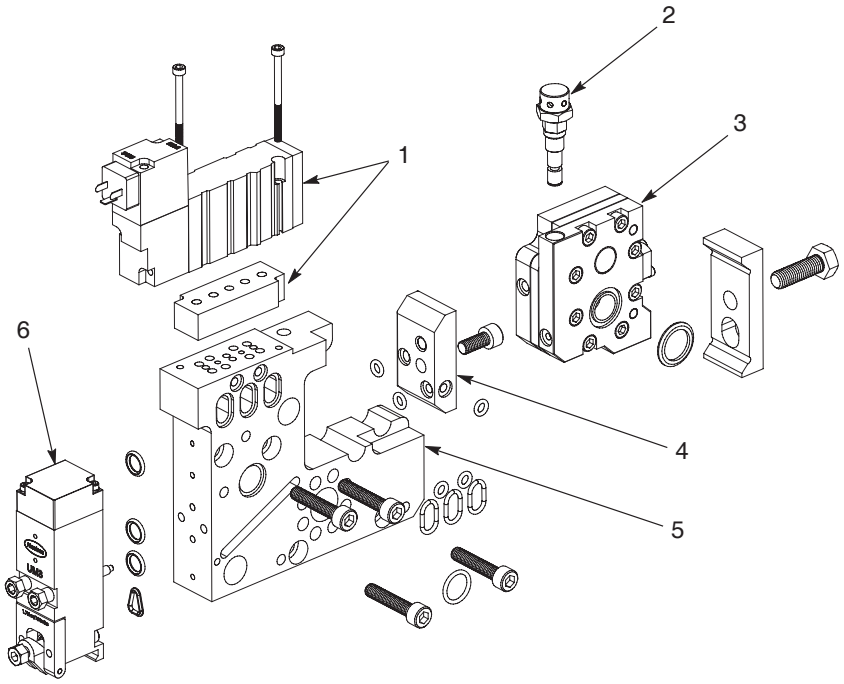


Figure 2-4 Components typically mounted on a manifold slice (manifold-mounted solenoid valve shown)

1. Manifold-mounted solenoid valve and heat isolation gasket
2. Rupture disk
3. Pump
4. Adhesive diverter plate
5. Manifold slice
6. Module

Manifold Slices *(contd)*

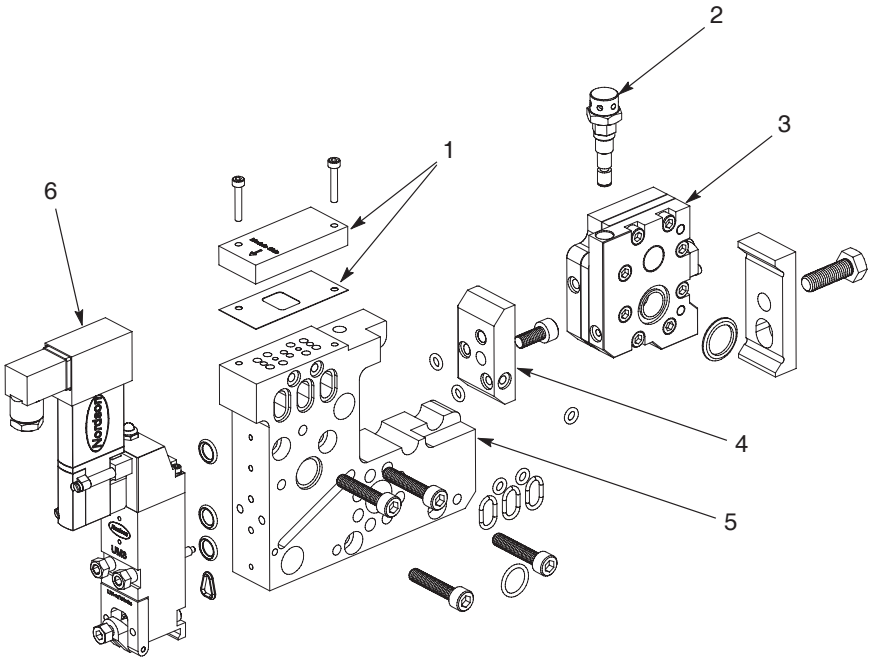


Figure 2-5 Components typically mounted on a manifold slice (flange-mounted solenoid valve shown)

1. Block-off plate and gasket
2. Rupture disk
3. Pump
4. Adhesive diverter plate
5. Manifold slice
6. Module with flange-mounted solenoid valve

Pumps

Mounted on each manifold slice is a metering gear pump. Many standard pump sizes are available. Figure 2-6 shows the key components of a pump.

Through the use of an adhesive diverter plate, the pumps can be configured to feed adhesive to one module only (for true metering operation) or to multiple modules (for semi-metering, or pressure-fed, operation). For more information on the adhesive diverter plate, refer to *Adhesive Diverter Plate* later in this section.

Pumps can be easily replaced using a special tool known as a pump puller. Refer to *Tools and Supplies* in Section 8, *Parts*, for the part number.

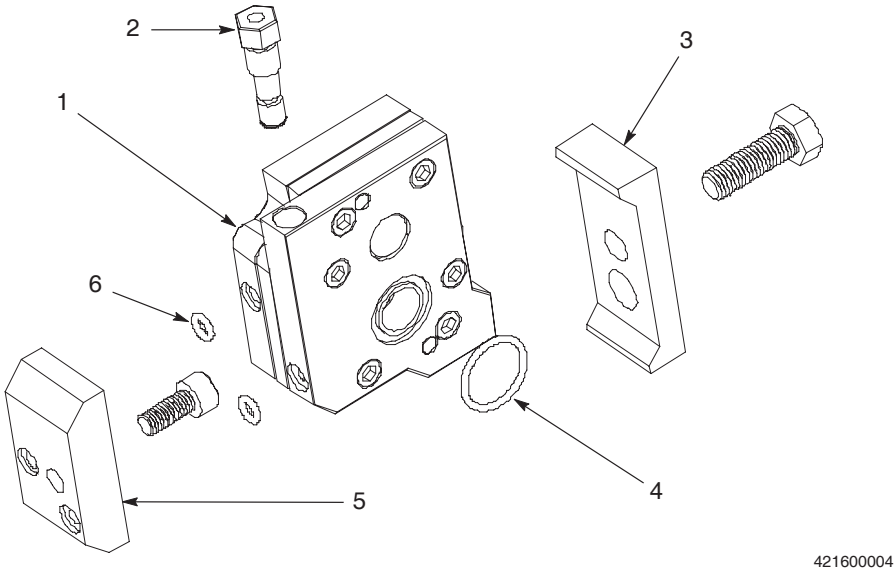


Figure 2-6 Pump components

1. Pump
2. Rupture disk
3. Pump clamp
4. Pump O-ring
5. Adhesive diverter plate
6. Adhesive diverter plate O-ring

Rupture Disks

Rupture disks are safety devices installed in each slice applicator pump to prevent high-pressure situations. Figure 2-6 shows the location of a rupture disk. If any blockages occur downstream of the pump output to the module, the pressure in the system will build until the rupture disk bursts at approximately 114 bar (1,650 psi), plus or minus a 3 percent tolerance. Operational factors that can cause the pressure in a slice applicator system to build to the point at which a rupture disk bursts include the following:

- nozzle clogging
- char or debris buildup in the applicator between the pump output and a module
- a recirculation port blocked with char or debris
- char or debris buildup inside a module
- startup of the pumps before the system has reaching the application temperature (in which case the adhesive viscosity may be too high)

When a rupture disk bursts to prevent a high-pressure situation, a new rupture disk must be installed. Refer to *Rupture Disk Replacement* in Section 7, *Repair*.

Dispensing Modules

The three-way adhesive dispensing modules used on the applicator have quick reaction times and provide consistency across applications. The most commonly used modules are the UM3 modules shown in Figure 2-7. The UM3 coating module is used in bead and slot applications. The UM3 spray module, either directly or through the use of an adapter, can be configured for a variety of spray applications, such as Controlled Fiberization, Summit, and meltblown applications, as well as for bead applications.

A block-off module is also available, allowing you to block off the adhesive output from an individual slice. Refer to the module documentation for information on the modules that may be used with the applicator.

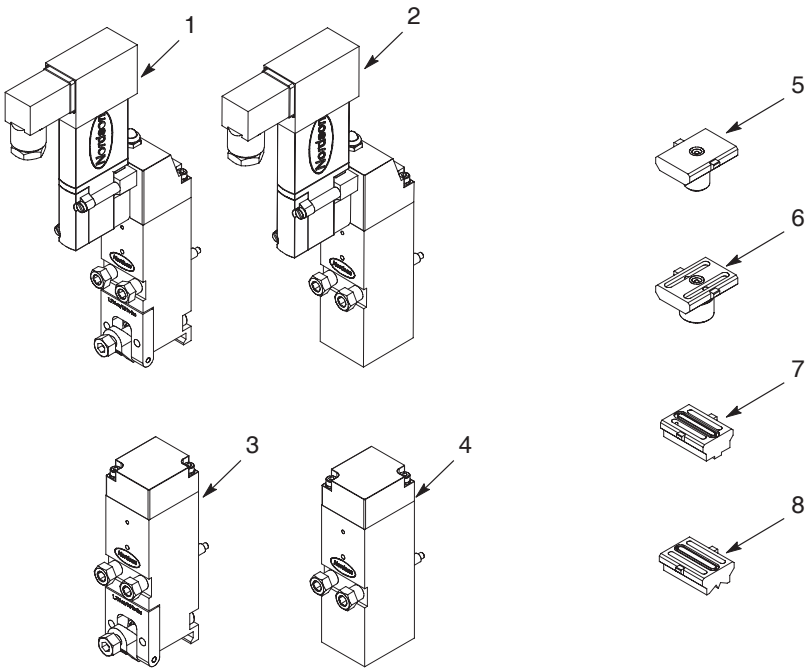


Figure 2-7 UM3 modules and associated adapters and dies

1. UM3 spray module with flange-mounted solenoid valve
2. UM3 coating module with flange-mounted solenoid valve
3. UM3 spray module (for use with manifold-mounted solenoid valves)
4. UM3 coating module (for use with manifold-mounted solenoid valves)
5. Bead adapter
6. Controlled Fiberization (CF) adapter
7. Summit die (no adapter required)
8. Meltblown die (no adapter required)

Solenoid Valves

Air is supplied to the applicator for two reasons:

- to open, or actuate, the modules (known as module-actuating air, or sometimes as control air)
- if applicable, to supply the modules with air that is combined with the adhesive exiting the modules to produce a variety of pattern types (known as pattern air, or sometimes as process air)

Solenoid valves are used to control the module-actuating air. Depending on the type of modules installed on the applicator, solenoid valves may be installed on the applicator manifold (manifold-mounted) or on the modules themselves (flange-mounted).

When manifold-mounted solenoid valves are present, heat isolation gaskets and block-off plates are used to control the air actuation for a single module, for all modules, or for various groupings of modules, as shown in Table 2-1. Figure 2-8 shows an example of how solenoid valves, heat isolation gaskets, and block-off plates might be configured.

Table 2-1 Types of Module Air Actuation

Type of Actuation	Description
Independent	One solenoid valve actuates one module
Group	One solenoid valve actuates all modules or several solenoid valves actuate various groups of modules
NOTE: For the best module performance in intermittent applications, Nordson Corporation recommends the use of one solenoid valve per module (independent actuation). Module performance will be sacrificed proportionately as more modules are controlled by a single solenoid valve (group actuation).	

When flange-mounted solenoid valves are present, solenoid valve diverter plates or block-off plates are used. Figure 2-9 shows an example of how solenoid valves, solenoid valve diverter plates, and block-off plates might be configured.

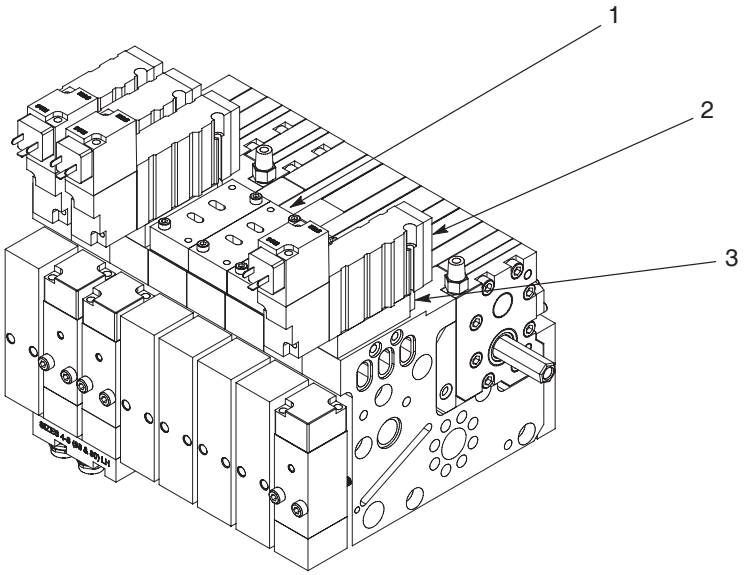


Figure 2-8 Example of manifold-mounted solenoid valves, heat isolation gaskets, and block-off plates

1. Block-off plate
2. Solenoid valve
3. Heat isolation gasket

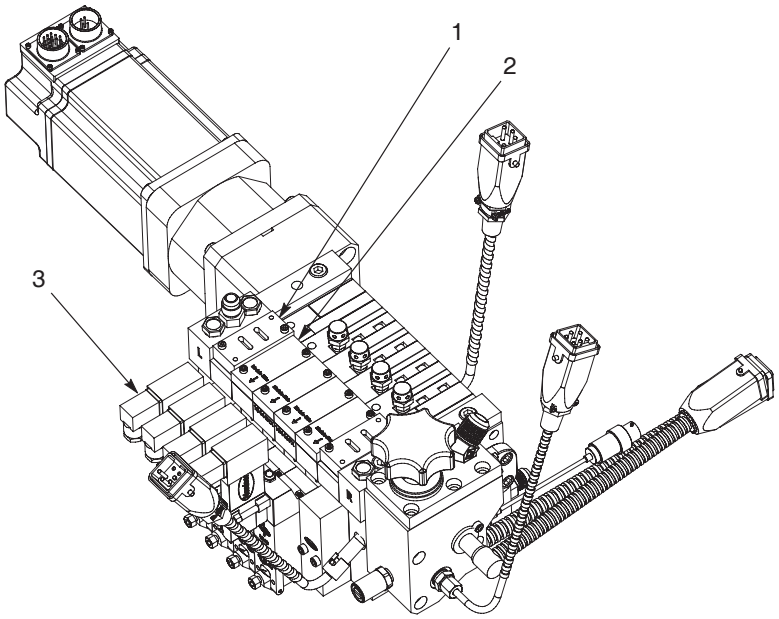


Figure 2-9 Example of flange-mounted solenoid valves, solenoid valve diverter plates, and block-off plates

1. Block-off plate
2. Solenoid valve diverter plate
3. Solenoid valve

Heat Isolation Gaskets

Heat isolation gaskets are installed between a manifold-mounted solenoid valve and a manifold slice to direct the air supply toward a single module, a single module and adjacent modules, or only adjacent modules, depending on which side of the gasket is positioned up or down, as shown in Figure 2-10.

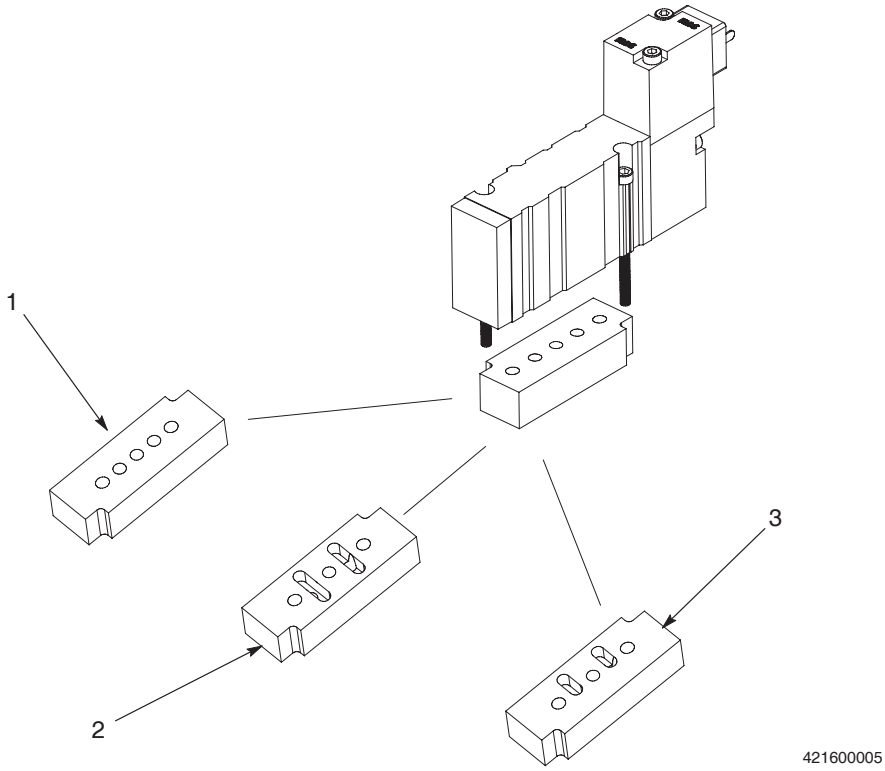


Figure 2-10 Heat isolation gasket configuration options (bottom side of gasket shown)

1. Independent actuation
2. Grouped actuation, left and right air flow
3. Grouped actuation, left or right air flow (depending on the orientation of the gasket)

Solenoid Valve Diverter Plates

Solenoid valve diverter plates are installed on manifold slices on which a UM3 module with a flange-mounted solenoid valve is used. The solenoid valve diverter plate blocks the air flow ports on the top of the manifold slice.

NOTE: Solenoid valve diverter plates are used only when UM3 flange-mount style modules are present.

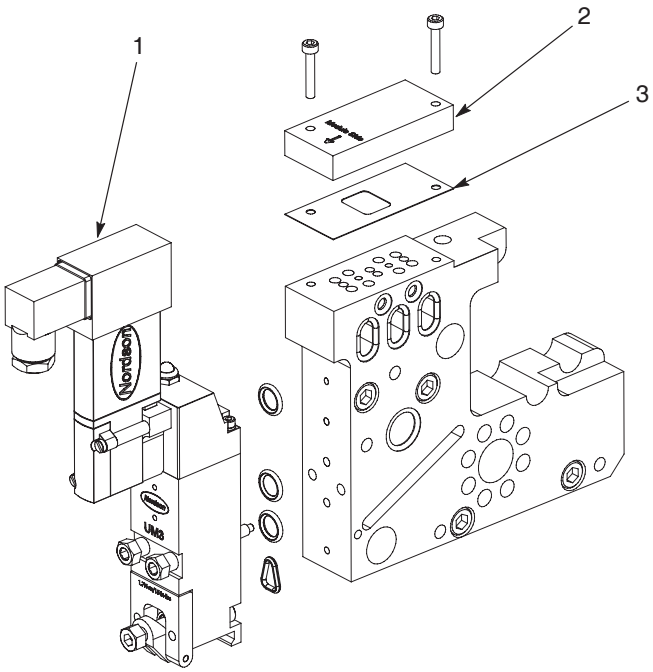


Figure 2-11 Solenoid valve diverter plate and gasket

1. UM3 module with flange-mounted solenoid valve
2. Solenoid valve diverter plate
3. Gasket

Block-Off Plates

Block-off plates are installed on slices that do not have a solenoid valve. A block-off plate can block the air flow completely or (like a heat isolation gasket) direct the air flow to a single module, a single module and adjacent modules, or only adjacent modules, depending on which side of the plate is positioned up or down, as shown in Figure 2-12.

NOTE: Block-off plates are used only when UM3 manifold-mount style modules are present.

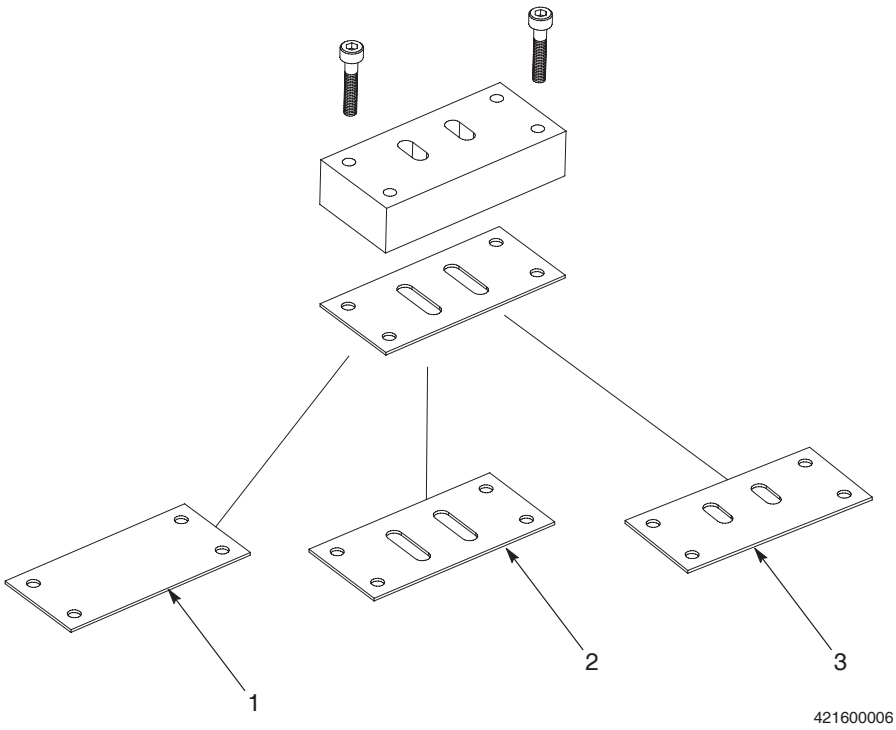


Figure 2-12 Block-off plate configuration options

1. Air flow blocked
2. Left and right air flow
3. Left or right air flow (depending on the orientation of the plate)

Adhesive Diverter Plate

An adhesive diverter plate is installed between a manifold slice and a pump to direct the flow of adhesive to the modules. Using an adhesive diverter plate, a pump can be configured to feed adhesive to one module only (for true metering operation) or to multiple modules (for semi-metering, or pressure-fed, operation). Flow rate accuracy decreases proportionately as the number of modules fed by one pump increases. Figure 2-13 shows the location of the adhesive diverter plate.

NOTE: Refer to *Manifold (Middle) Slice Parts* in Section 8, *Parts*, for a table that shows the configuration possibilities for the adhesive diverter plate.

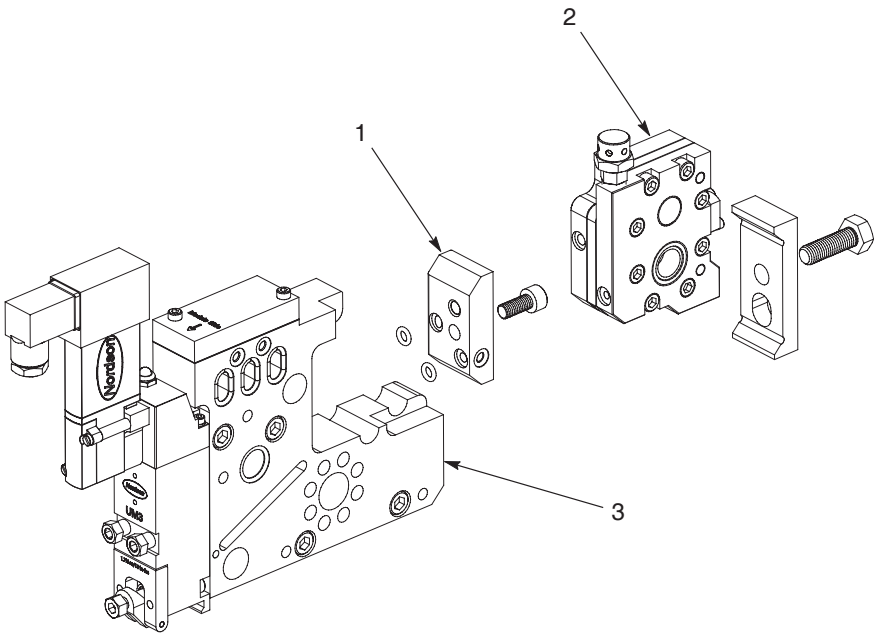


Figure 2-13 Location of the adhesive diverter plate

1. Adhesive diverter plate
2. Pump
3. Manifold slice

Filter Block

The filter block, located on the end of the applicator opposite the motor, is the point at which adhesive enters the applicator. The filter block includes the hose fitting, the filter, the drain valve, and the pre- and post-pressure transducer plugs, into which optional pressure transducers may be installed. Figure 2-14 shows the key components of the filter block.

Preventive maintenance for the applicator includes changing the filter basket on an as-needed basis to ensure consistent operation of the applicator. Pressure readings supplied by pressure transducers (if present) can help determine when the filter basket needs to be changed.

The drain valve is used to relieve pressure in the system for safety during maintenance and repair activities.

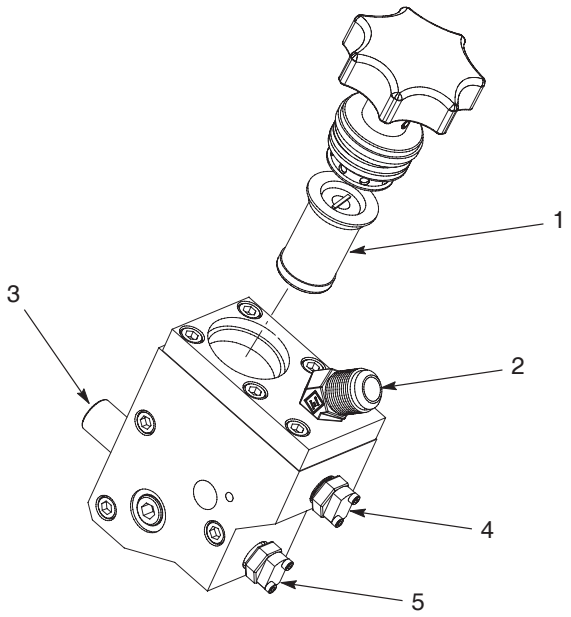


Figure 2-14 Filter block components

1. Filter basket
2. Hose fitting
3. Drain valve
4. Pre-filter pressure transducer plug
5. Post-filter pressure transducer plug

Motor

The applicator pumps are driven by a motor, reducer, and shaft assembly, also known as the drive. The motor and reducer are available in many configurations, including inline and right-angle configurations, as shown in Figure 2-15. The reducer ratio is always 10:1. The shaft length varies depending on the number of slices in the applicator.

The drive may be mounted on either the left or right side of the applicator. Moving the drive from one side of the applicator to the other is known as changing the “hand” of the applicator. When this occurs, the rotational direction of the motor must be checked to ensure proper operation. The procedure for checking the motor rotational direction is provided in Section 7, *Repair*.

NOTE: The front of the applicator is always the side on which the modules are installed.

The motor speed is controlled through the melter control system or through a Universal slice controller, although other customer-specified control equipment may be used.

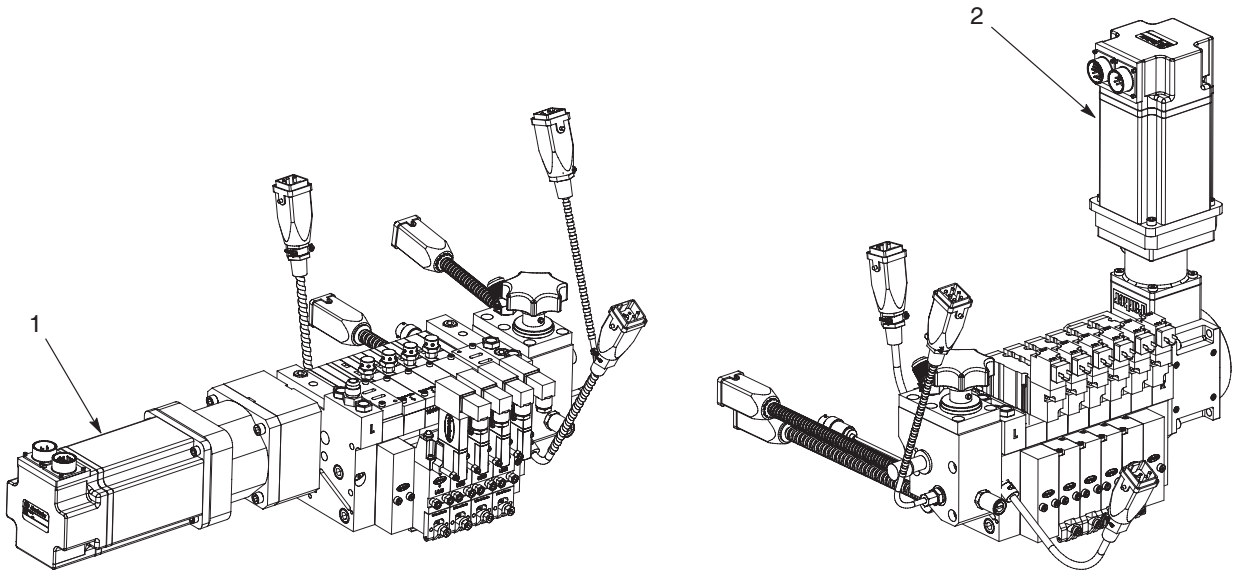


Figure 2-15 Inline and right-angle drive configurations

1. Inline drive
2. Right-angle drive

This page intentionally left blank.

Heating and Temperature Control

Heating and temperature control of the Universal slice applicator are accomplished by the cartridge heaters and temperature sensors installed on the applicator.

Heaters

Heating of the adhesive and air (if used) that flows through the manifold slices is accomplished through cartridge-type heaters that slide through all of the slices present on the applicator. All heaters have a quick-change plug. The heater length varies depending on the number of slices present. Figure 2-16 shows the location of the adhesive and air heaters on an applicator.

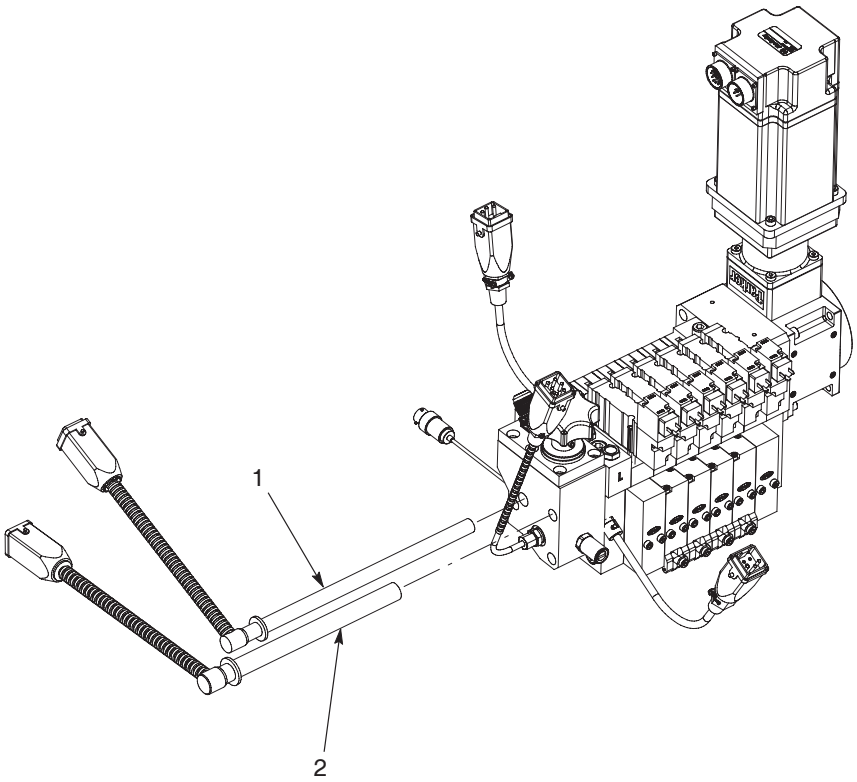


Figure 2-16 Location of the adhesive and air heaters

1. Adhesive heater
2. Air heater

Temperature Sensors

Temperature sensing and control is accomplished through 100-ohm platinum or 120-ohm nickel resistance temperature detectors (RTDs) or J-type thermocouples. Four types of temperature sensor may be present on the applicator—refer to Table 2-2. Figure 2-17 shows the location of the sensors on the applicator.

The applicator uses a modular quick-change plug system for all sensors. A quick-change, bayonet-style thermowell is used for the installation of the adhesive and air temperature sensors. All manifold slices can accommodate a temperature sensor for heated air. By moving the air temperature sensor from slice to slice, temperature profiles may be evaluated for each slice, enhancing diagnostic capabilities.

Table 2-2 Types of Temperature Sensor

Temperature Sensor	Description	Location
Adhesive temperature sensor (always present)	Provides sensing and temperature control of the adhesive flowing through the applicator. The adhesive temperature sensor may be a fixed-depth 100-ohm platinum or 120-ohm nickel resistance temperature detector (RTD) or a J-type thermocouple.	One end slice. For the best temperature control, the sensor should be mounted on the end plate on the filter block side.
Air temperature sensor (present if pattern air is used)	Provides sensing and temperature control of the pattern air flowing through the applicator. The air temperature sensor may be a fixed-depth 100-ohm platinum or 120-ohm nickel resistance temperature detector (RTD) or a J-type thermocouple.	Any manifold slice, although the recommended installation location is the center-most slice of the applicator
Immersion sensor (optional)	**CAUTION:** Risk of fire or equipment damage. The optional immersion sensor must be used only for temperature sensing—not for temperature control. Provides sensing, but not control, of the actual temperature of the adhesive. The immersion sensor may be a 100-ohm platinum or 120-ohm nickel RTD or a J-type thermocouple.	Filter block
Pump temperature sensor (optional)	Provides sensing, but not control, of the temperature of a pump. The pump sensor may be a 100-ohm platinum or 120-ohm nickel RTD or a J-type thermocouple.	Thermowell of any manifold slice

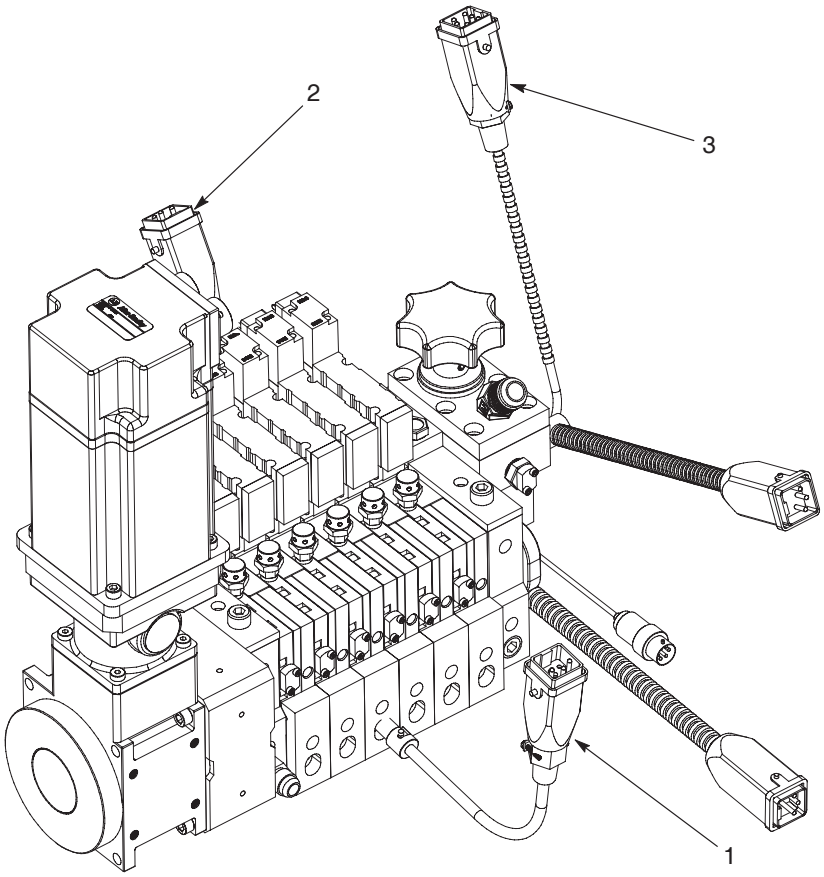


Figure 2-17 Location of the temperature sensors

1. Air temperature sensor
2. Adhesive temperature sensor
3. Immersion sensor (option)

Note: The optional pump temperature sensor is not shown.

Pressure Monitoring

Optional pressure transducers may be present on your applicator. Pressure transducers allow you to monitor the hydraulic pressure at the following points in the applicator:

- **Pre-filter**—A pre-filter pressure transducer monitors the pressure of the adhesive flow before it enters the applicator.
- **Post-filter**—A post-filter pressure transducer monitors the pressure of the adhesive flow after the filter but before the pumps. Comparing the differential between the pre-filter and post-filter pressure readings is the best way to determine when the filter basket needs to be replaced.
- **Pump**—A pump pressure transducer monitors the pressure of the adhesive flow between the pump output and the module (known as the application pressure). Tracking this pressure reading provides the best way to predict module failure or nozzle clogging.

Figure 2-18 shows the two types of pressure transducer: standard ($^1/_2$-20 threaded) and miniature. Standard pressure transducers can be installed only in the pre-filter and post-filter locations on the filter block. Miniature pressure transducers, however, can be installed in the filter block or in any pump.

Pressure transducers are connected to the customer's pressure monitoring equipment (melter control system, Universal slice controller, etc.) via pressure transducer cables. Extension cables may be used if needed.

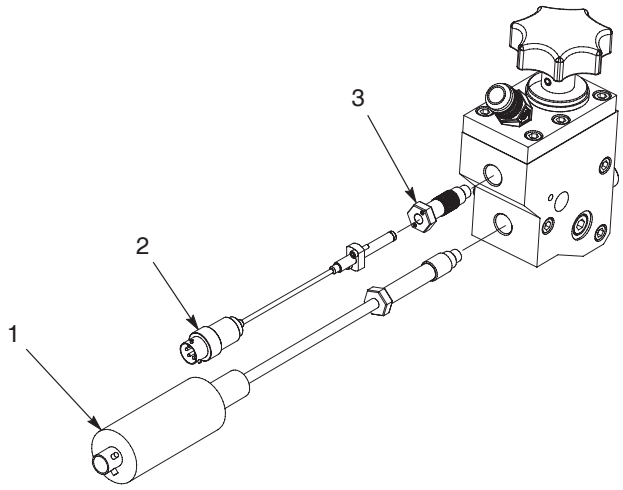


Figure 2-18 Pressure transducers

1. Standard pressure transducer
2. Miniature pressure transducer
3. Adapter fitting (required only for miniature transducers)

Section 3
Installation

WARNING: Allow only personnel with appropriate training and experience to operate or service the equipment. The use of untrained or inexperienced personnel to operate or service the equipment can result in injury, including death, to themselves and others, and damage to the equipment.

Introduction

This section provides procedures for installing the applicator and preparing it for initial operation.

Items Needed

You will need the following items to install the applicator:

- personal protective equipment for working with hot adhesive
- drain pans and waste containers suitable for waste adhesive
- device to lift and position the applicator
- heated hydraulic hose
- air line tubing ($^3/_8$ in. or 10 mm internal diameter or larger)
- set of standard and metric hex-head wrenches
- flat-blade and Phillips-head screwdrivers
- O-ring lubricant
- anti-seize lubricant
- PTFE tape

Applicator Installation

1. Carefully unpack the applicator and inspect if for any damage that may have occurred during shipping. Look for any dents and scratches and make sure all fasteners are tight. Report any damage to your Nordson representative.
2. Select a mounting location that
   - provides enough clearance to service the applicator

     NOTE: Refer to Section 9, *Technical Data*, for the applicator dimensions and clearances.
   - will not subject the applicator to extreme vibration or temperature variations
   - will allow you to properly route hoses (see Figure 3-3)
   - is close to a supply of dry, regulated, unlubricated air
   - will allow you to adjust the distance between the applicator and the product surface
3. Move the applicator into the position where it will be mounted. Refer to the applicator-specific reference drawing provided with this manual for the weight of the applicator.
4. See Figure 3-1. Mount the applicator on the production line using M8 bolts in the mounting holes in the end slices. Be sure to install the insulators.

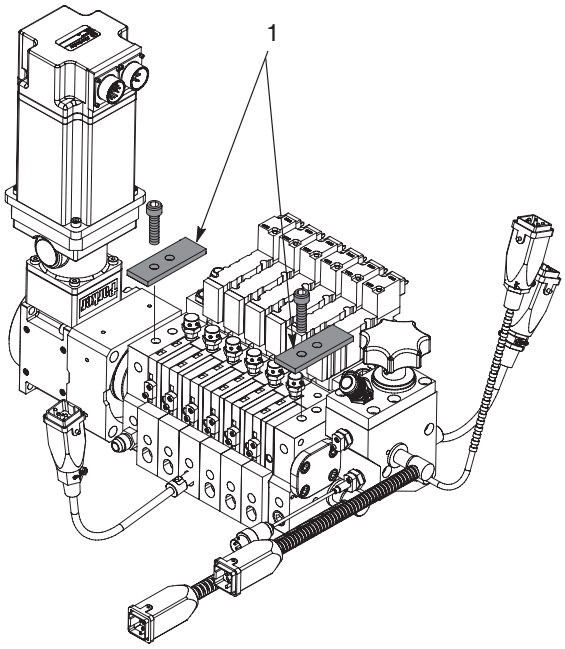


Figure 3-1 Mounting the applicator

1. Insulators

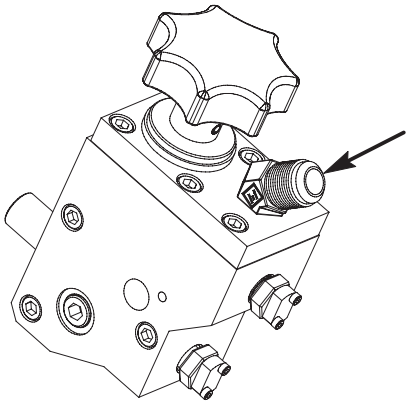
Hose Installation

Throughout the hose installation process, follow the guidelines shown in Figure 3-3.

CAUTION: Improper routing and venting of hoses could result in overheating, damage, and poor adhesive flow. To ensure proper operation, do not bundle or tie-wrap the hoses, do not bend the hoses at sharp angles, and do not allow the hoses to lay on concrete floors or other cool surfaces that could conduct heat away from a hose.

1. Connect the adhesive supply hose for the applicator to the melter. Refer to the melter manual as needed.
2. Route the hose from the melter to the applicator.
3. See Figure 3-2. Use two wrenches to connect the hose to the hose fitting located on the filter block.

   NOTE: Hose cordsets should be located at the melter end (where adhesive enters the hose). This ensures that the hose sensor measures the temperature of the adhesive exiting the hose.



421600016

Figure 3-2 Location of the hose fitting on the filter block

Hose Installation *(contd)*

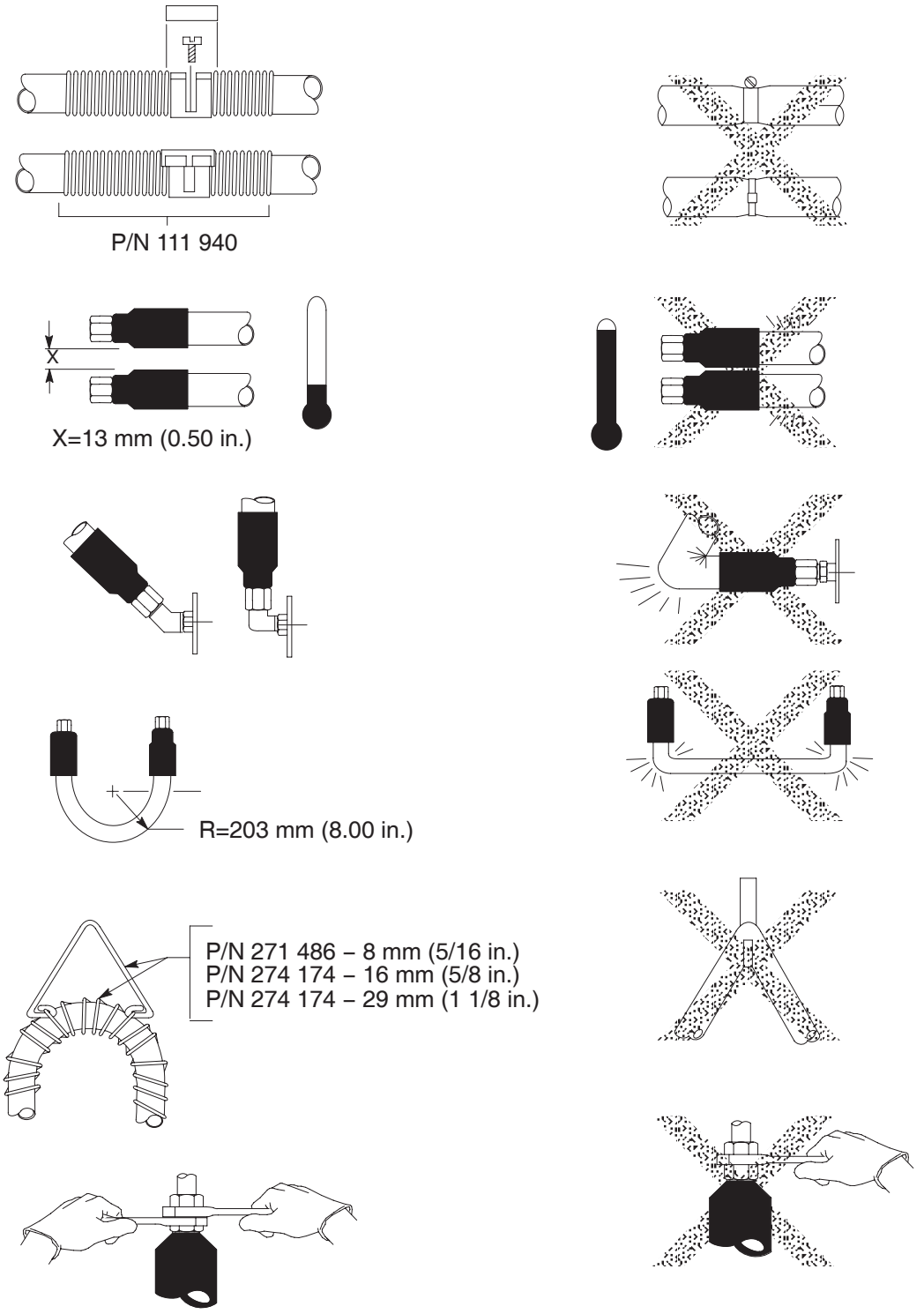


Figure 3-3 Hose installation guidelines

Air Supply Installation

Connect a supply of clean, dry, unlubricated air to the applicator for module actuation and, if applicable, heated pattern air. Refer to Table 3-1.

NOTE: Nordson Corporation recommends the installation of a 5-micron coalescing pre-filter.

NOTE: For recommended air supply operating pressures, refer to *Applicator Specifications* in Section 9, *Technical Data*.

NOTE: For an explanation of how the flow of module-actuating air is configured, refer to *Solenoid Valves* in Section 2, *Description*.

Table 3-1 Air Supply Connections

Type of Air Supply	Purpose	Item Number in Figure 3-4
Module-actuating air	To open and close the modules	1
Pattern air	To provide the air for spray applications	2

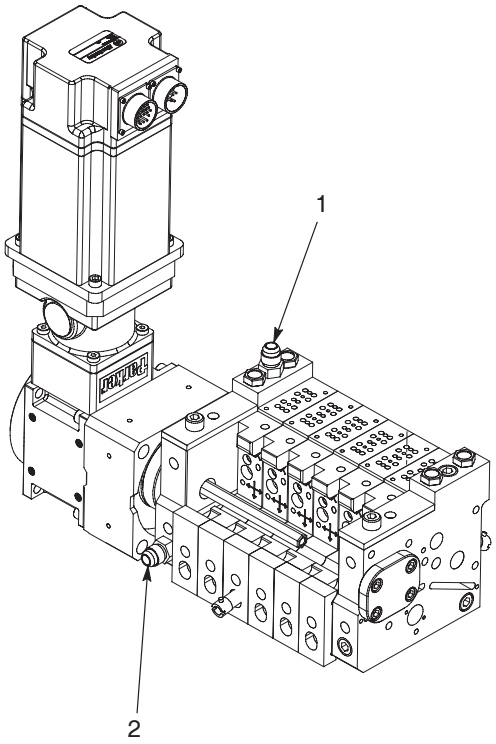


Figure 3-4 Location of air supply connections

1. Module-actuating air inlet
2. Pattern air inlet

Electrical Installation

Electrical installation includes connecting cordsets and connecting the solenoid valve wiring.

Connect the Cordsets

Connect the cordsets shown in Table 3-2 to the appropriate control equipment. Refer to the control equipment documentation or contact your Nordson representative for assistance as needed.

NOTE: Refer to Section 8, *Parts*, for extension cables available for use with the Universal slice controller.

Table 3-2 Applicator Cordsets (see Figure 3-5)

Cordset	Location	Function
Adhesive heater	Filter block	Heats the adhesive portion of the manifold
Air heater (if used)	Filter block	Heats the pattern air portion of the manifold for spray applications
Adhesive temperature sensor (RTD or J-type thermocouple)	End slice opposite the filter block	Senses the temperature of the adhesive portion of the manifold
Air temperature sensor (RTD or J-type thermocouple) (if used)	Manifold slice as chosen by the customer (center-most slice recommended)	Senses the temperature of the pattern air portion of the manifold
Immersion sensor (RTD or J-type thermocouple) (if present)	Filter block	Senses the temperature of the adhesive itself
Pump temperature sensor (RTD or J-type thermocouple) (if present)	Pump(s) as chosen by the customer	Senses the temperature of a pump
Pre-filter pressure transducer (if present)	Filter block	Measures the hydraulic pressure of the adhesive flow before it enters the applicator filter
Post-filter pressure transducer (if present)	Filter block	Measures the hydraulic pressure of the adhesive flow after the filter but before the applicator manifold
Pump pressure transducer (if present)	Pump(s) as chosen by the customer	Measures the hydraulic pressure of the adhesive flow as it exits the pump
Flow meter (if present)	Between the filter block and an end slice	Measures and/or controls the adhesive flow rate

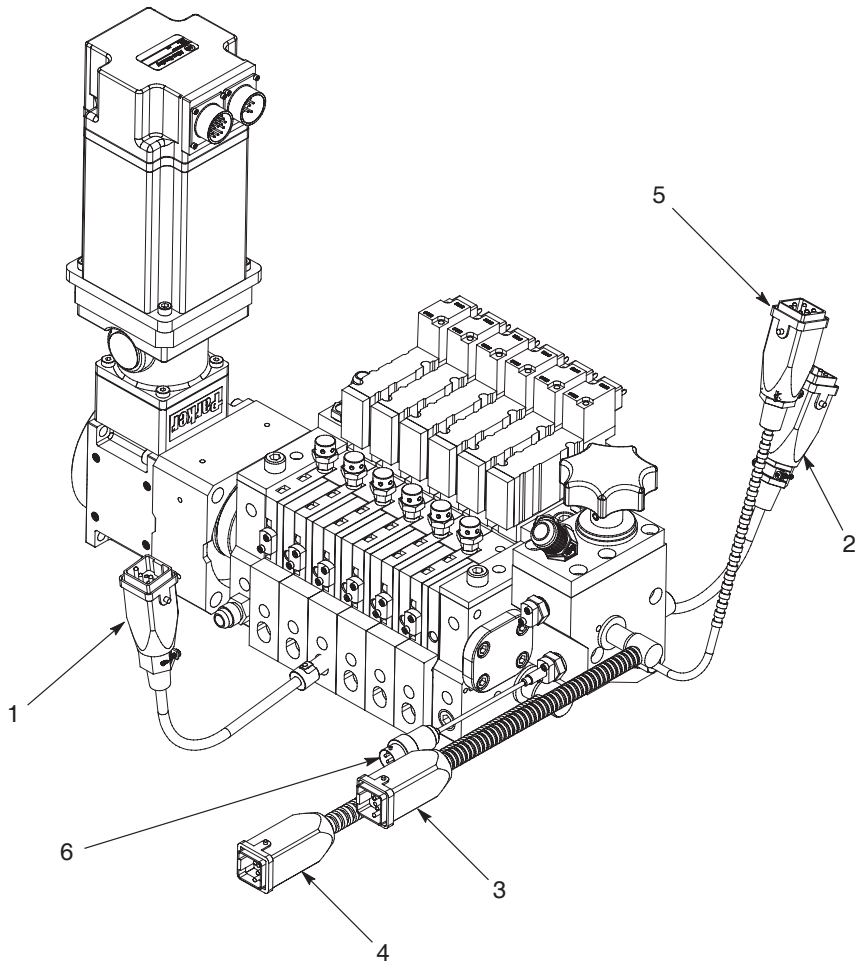


Figure 3-5 Applicator cordsets

1. Air temperature sensor
2. Adhesive temperature sensor
3. Air heater
4. Adhesive heater
5. Immersion sensor (option)
6. Pressure transducer (option)

Note: Only one filter block pressure transducer is shown; other transducers may be present. The optional pump temperature sensor(s) and flow meter are not shown.

Connect the Solenoid Valve Wiring

Connect the solenoid valve wiring to the control equipment (such as a PLC/PLS or pattern controller) that will send the signal to actuate the modules. Refer to the control equipment documentation.

Initial Startup

Before operating the applicator for the first time, follow these steps to ensure that the applicator was properly installed and to prepare it for flushing and supply pressure adjustment.

1. Apply power to the applicator.
2. Set the temperatures for the heated adhesive and, if applicable, the heated pattern air.

   NOTE: Refer to the adhesive's technical data sheet for the recommended application temperature.

   NOTE: For the best results, the difference between the adhesive temperature and the pattern air temperature should not exceed 15 degrees.
3. Turn on the module-actuating air and set the pressure.
4. If applicable, turn on the pattern air and set the pressure.

   NOTE: Refer to *Applicator Specifications* in Section 9, *Technical Data*, for air pressure specifications.
5. Start the production line.
6. When the adhesive and pattern air temperatures have reached their setpoints, apply the module-actuation signal to the solenoid valves to test the adhesive output.
7. Set the applicator pump speed and start the pump.

   NOTE: Refer to *Applicator Specifications* in Section 9, *Technical Data*, for the minimum, maximum, and recommended pump speeds.

CAUTION: Operation of the applicator when the rotational direction of the pump shaft is incorrect will severly damage the applicator.

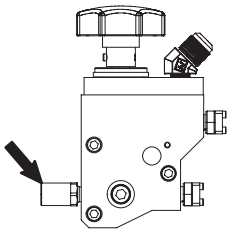
8. If there is no adhesive output, stop the melter and applicator pumps and refer to *Motor Rotational Check* in Section 7, *Repair*, to verify that the pump shaft is rotating in the correct direction. Return here to continue.
9. When the applicator is applying adhesive properly, continue to the next procedure to flush the applicator.

Applicator Flushing

Flushing the applicator removes fluid, cleaning solution, adhesive, and other contaminants. Flushing also helps to prevent clogging of the filter or nozzles and makes the applicator work more efficiently. The applicator should be flushed

- before initial use
- anytime you change the adhesive in the hot melt system

Refer to the melter manual as needed for the procedures for operating the melter.



Applicator drain valve

1. Heat the system to application temperature.
2. Check for leaks and tighten fittings as needed.
3. Relieve system pressure at the melter.
4. Place a drain pan under the applicator drain valve.
5. Open the applicator drain valve by turning the drain valve screw one turn counterclockwise.
6. Start the melter pump and increase the speed as needed until adhesive flows from the applicator drain valve.
7. When the adhesive flowing from the drain valve is free of contaminants and debris, stop the melter pump.
8. Tighten the applicator drain valve screw to close the drain valve.
9. Continue to the next procedure to adjust the system supply pressure.

Supply Pressure Adjustment

Slice applicators are equipped with positive-displacement pumps to provide localized metering of the adhesive at the point of application. To ensure the best performance in metering accuracy, it is important to understand how to properly setup the adhesive supply to the applicator.

About positive-displacement pumps

Positive-displacement-type metering pumps are the type of pump used on most “metered” hot melt equipment. These pumps are manufactured to a very tight set of tolerances with regard to how the metering gears fit into their respective internal glands, which is why they are called positive-displacement pumps.

However, even though the fit of the gears is extremely tight (~ 50 millionths of an inch), a gap does exist between them. Therefore, to gain the best possible performance from this type of pump, it is important to minimize the amount of differential pressure between the pump inlet and outlet. The higher the differential pressure, the more fluid (adhesive, etc.) you will have to pass through this gap.

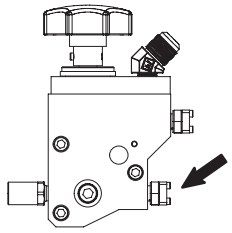
The fluid supply pressure needed to adequately feed a positive-displacement pump is relatively low. The main goal is simply to keep the pump full of adhesive, primarily to provide adequate lubrication to the gears to prevent seizure.

To ensure that the supply pressure is set correctly for your application needs, complete the steps in the following supply pressure adjustment procedure.

Supply pressure adjustment

1. Disable the applicator and install the necessary pressure indications. Refer to Table 3-3.

   NOTE: Pressure readings will be needed on the inlet to the applicator and on the opposite end of the slice pump supply channel (internal to the applicator). If these pressure indications do not exist, the procedures shown in Table 3-3 are provided. Part numbers for these components are provided in Section 8, *Parts*.



Location on the filter block to install a post-filter pressure indication

Table 3-3 Methods for Establishing Pressure Indications

Location of Pressure Indication	Procedure for Establishing the Pressure Indication
Filter block (input pressure, post-filter)	**Option 1**—See Figure 3-6. Install either a standard or miniature pressure transducer at the post-filter location on the filter block. Refer to *Field-Install a Standard Pressure Transducer* or *Field-Install a Miniature Pressure Transducer* in Section 7, *Repair*, as needed. For pressure transducer part numbers, refer to Section 8, *Parts*. **Option 2**—Install a pressure gauge between the supply hose and the input fitting on the filter block. Nordson offers a differential pressure gauge kit for this purpose. Refer to *Service Kits* in Section 8, *Parts*, for the kit part number.
Pump supply channel (motor side)	See Figure 3-7. Install a miniature pressure transducer in the adhesive supply channel in the access port ($^1/_4$ NPT) located on the motor side. You will need an adaptor (part 1044900) to complete this installation. Refer to Section 8, *Parts*, and to *Field-Install a Miniature Pressure Transducer* in Section 7, *Repair*, as needed.

Supply Pressure Adjustment *(contd)*

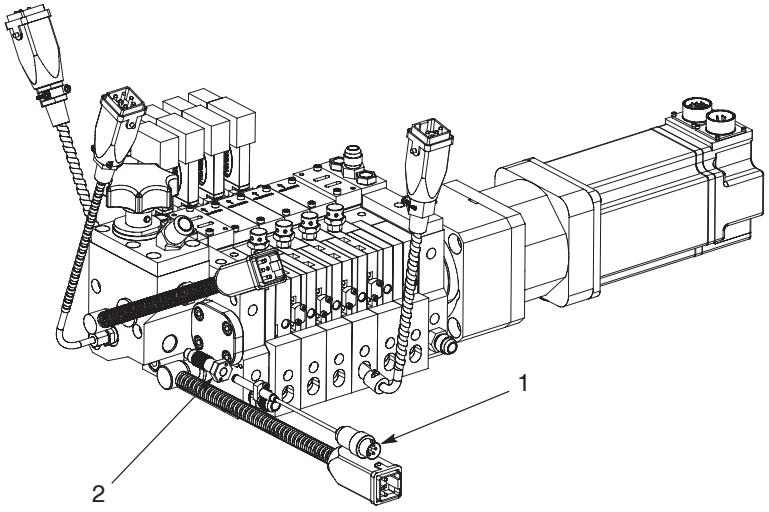


Figure 3-6 Location for installing a pressure transducer in the filter block (miniature pressure transducer shown)

1. Miniature pressure transducer
2. Adapter fitting (required for miniature pressure transducers only)

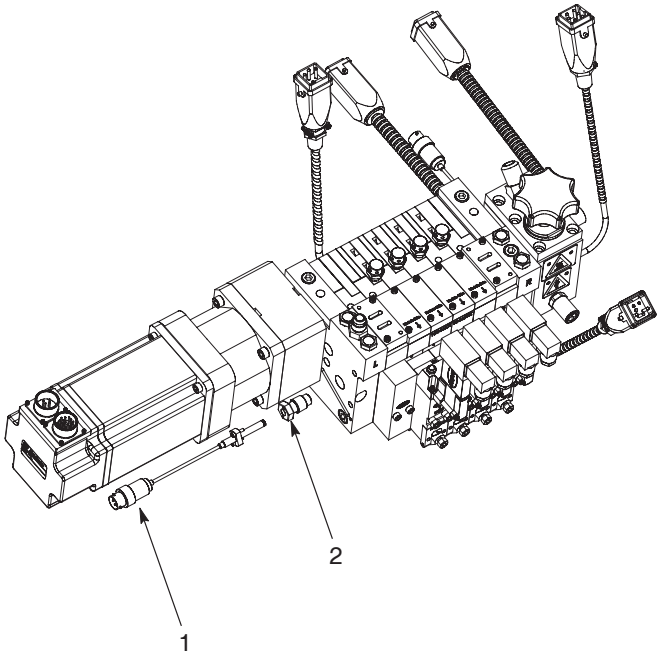


Figure 3-7 Installing a miniature pressure transducer on the motor side

1. Miniature pressure transducer
2. Adapter (part 1044900)

2. As a starting point, set the adhesive supply unit (melter, remote metering station, etc.) to supply 110% of the adhesive consumption of the slice applicator.

   NOTE: To correctly calculate the applicator's adhesive consumption, you must consider the following:

   Pump capacity—Add up all the individual pump capacities of your applicator. Example: eight pumps at 0.584 cc/rev per pump = 4.672 cc/rev total.

   Pump shaft rpm—A common shaft is used to drive all the applicator pumps

   Pattern being produced—If an intermittent pattern is being used, the duty cycle (percentage of actual dispensing time of the pattern) should be included in your calculation. (for example, a 50-percent duty cycle for a given slice position would drop that pump's flow requirement by half).

   To set the rate of adhesive supply, adjust the rpm of the supply pump accordingly based on its size (cc/rev).

3. Run the system in actual production mode.

   NOTE: The pump rpms should replicate full production line speeds to provide accurate flow rates and pressures.

   NOTE: If an intermittent pattern is being used, the applicator should be dispensing the exact pattern desired, as it would be in actual production.

4. Set the pressure adjustment on the adhesive supply unit as follows:

   a. Start the adhesive supply unit with its pressure control valve (PCV) at the lowest position.

   b. Slowly adjust the PCV to gradually increase the output pressure of the supply unit.

   c. Monitor both pressure indications (pressure transducer readings) on the slice applicator. You will first notice a pressure rise on the filter block (inlet) side.

   d. After allowing adequate time for the system to stabilize, begin raising the inlet pressure slowly until the pressure transducer on the opposite end of the slice applicator reads the same as the transducer on the inlet side [+/– 1 bar (14.5 psi)]. Allow the system to stabilize after each adjustment, and recheck your pressure readings.

Supply Pressure Adjustment *(contd)*

e. When both transducer readings are the same, there is adequate pressure within the supply channel to fill all the pumps in the slice applicator.

   NOTE: It is acceptable to increase the supply pressure by 1 bar (14.5 psi) above this equalization point to ensure that the supply pressure does not drop below the required level to keep the supply channel full. Slightly higher pressure settings may need to be considered based on capability of the supply system to maintain a consistent flow rate.

   Example: AC motors running at slow speeds produce a wider swing in rpm, producing a higher variability in flow rate.

Summary

After following the above procedure, you are now ready to run in actual production. If any changes to pump size, pump rpm, or intermittent pattern size occur, you must repeat this procedure to ensure the correct supply pressure.

To gain the best possible control of the supply pressure at the applicator, Nordson Corporation recommends a “closed-loop” control scheme, described in detail below.

Closed-loop control scheme

Most applicators are several feet away from their adhesive supply source, requiring heated hoses to transfer the molten adhesive to the applicator. As discussed above, the supply pressure to the applicator is adjusted with the pressure control valve (PCV) at the supply source, which is several feet away. The greater this distance is, the more time it takes for an increase in pressure at the applicator to reach the PCV at the supply source, thus relieving the overpressure condition.

Due to this time lag, there is a constant fluctuation in pressure at the applicator that in turn constantly changes the pressure differential between the pump inlet and outlet. To keep this fluctuation to a minimum, use the pressure transducer on the applicator to control the rpm of the pump on the supply source. This method provides a digital signal to the motor drive control, allowing it to adjust the supply pump rpm accordingly to maintain the correct pressure at the applicator. This has proved to be a much faster response than the PCV approach, and greatly reduces the pressure variation.

Section 4
Operation

WARNING: Allow only personnel with appropriate training and experience to operate or service the equipment. The use of untrained or inexperienced personnel to operate or service the equipment can result in injury, including death, to themselves and others, and damage to the equipment.

Introduction

This section provides procedures for operating the applicator. Before you operate the applicator for the first time, make sure you have

- completed the installation procedures in Section 3, *Installation*
- completed the initial startup, applicator flushing, and supply pressure adjustment procedures in Section 3, *Installation*

Startup

Procedures for starting and stopping the applicator vary depending on the type of melter you are using. Refer to the melter manual for complete startup and shutdown procedures.

1. Heat the system to application temperature.
2. Turn on the module-actuating air.
3. Turn on the pattern air.

   NOTE: Recommended settings for the module-actuating air pressure, pattern air pressure, and system hydraulic pressure are provided in *Applicator Specifications* in Section 9, *Technical Data*.

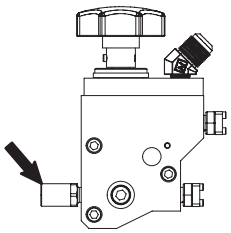
Startup *(contd)*

4. Start the melter pump(s). The melter pump(s) should supply about 20 percent more adhesive than the applicator needs. Refer to *Supply Pressure Adjustment* in Section 3, *Installation*, as needed.
5. Start the applicator pump. Refer to *Applicator Specifications* in Section 9, *Technical Data*, for the minimum, maximum, and recommended pump speeds.
6. Start the production line.
7. During operation, monitor temperatures and pressures. Both should remain constant.

Shutdown

Procedures for starting and stopping the applicator vary depending on the type of melter you are using. Refer to the melter manual for complete startup and shutdown procedures.

1. Stop the production line.
2. Stop the applicator pump.
3. Stop the melter pump(s).
4. Relieve system pressure as follows:
   a. Place a drain pan under the applicator drain valve.
   b. Turn the drain valve screw one turn counterclockwise and allow adhesive to drain from the drain valve.
   c. Tighten the drain valve screw to close the drain valve
5. Remove power to the applicator.
6. Turn off the module-actuating air.
7. Turn off the pattern air.



Applicator drain valve

Section 5
Maintenance

WARNING: Allow only personnel with appropriate training and experience to operate or service the equipment. The use of untrained or inexperienced personnel to operate or service the equipment can result in injury, including death, to themselves and others, and damage to the equipment.

Introduction

This section contains a recommended maintenance schedule and procedures for properly maintaining your applicator. Attempting any other maintenance procedures can result in equipment damage, improper system operation, or personal injury.

Maintenance Schedule

Table 5-1 provides recommended maintenance activities and a schedule for performing those activities. Base how often you perform maintenance on your operating conditions.

Table 5-1 Recommended Maintenance Activities and Schedule

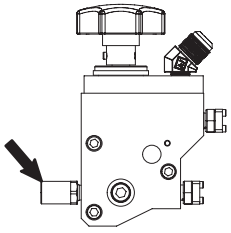
Frequency	Maintenance Activity
Daily	• Keep the supply of adhesive clean and free of contaminants. Foreign particles in the adhesive can block the filter or nozzles. • Check the hose connection for leaks. If a leak is found, replace the hose fitting and/or O-ring as appropriate.
As needed	• Verify that all electrical connections are secure. Vibration and heating or cooling cycles can loosen cordset and cable connections. • Replace the filter basket. Refer to *Filter Basket Replacement* in this section. • Clean nozzles. Refer to the nozzle cleaning procedure in the module documentation. • Disassemble and clean (including lapping) the applicator. Depending on the application for which the applicator is used, this should be required no more than once every two to three times that routine preventive maintenance activities are scheduled. For complete applicator disassembly and reassembly procedures, refer to Section 7, *Repair*.

Filter Basket Replacement

The filter assembly contains a disposable basket-style filter that captures debris in the adhesive before it enters the manifold. This filter basket must be periodically replaced to prevent restriction of the adhesive flow.

NOTE: Cleaning and reuse of the filter basket is not recommended**.**

CAUTION: Risk of filter damage. Do not attempt to remove or disassemble the filter assembly until the adhesive in the system has reached the softening point.



Applicator drain valve

1. Heat the system to application temperature.
2. Stop the supply of adhesive to the applicator.
3. Relieve pressure from the applicator by turning the drain valve screw (located on the front of the filter block) one turn counterclockwise.
4. See Figure 5-1. Unscrew the filter knob and remove the knob assembly.

Figure 5-1 Removing the filter knob

Filter Basket Replacement *(contd)*

5. See Figure 5-2. Remove the filter basket and discard it.
6. Install a new filter basket and ensure that it is seated properly in the cavity.

Figure 5-2 Replacing the filter basket

7. Reinstall the filter knob.
8. Restore the system to normal operation.

Section 6
Troubleshooting

WARNING: Allow only personnel with appropriate training and experience to operate or service the equipment. The use of untrained or inexperienced personnel to operate or service the equipment can result in injury, including death, to themselves and others, and damage to the equipment.

Introduction

Troubleshooting begins when the flow of adhesive from the applicator stops or diminishes unexpectedly or when a control system alerts you of a problem through an alarm or visual display. This section covers only the most common problems you may encounter. If you cannot solve a problem with the information given here, contact your local Nordson representative for help.

For additional troubleshooting information, refer to the manuals provided with the other equipment used in the hot melt system.

Applicator Heating Problems

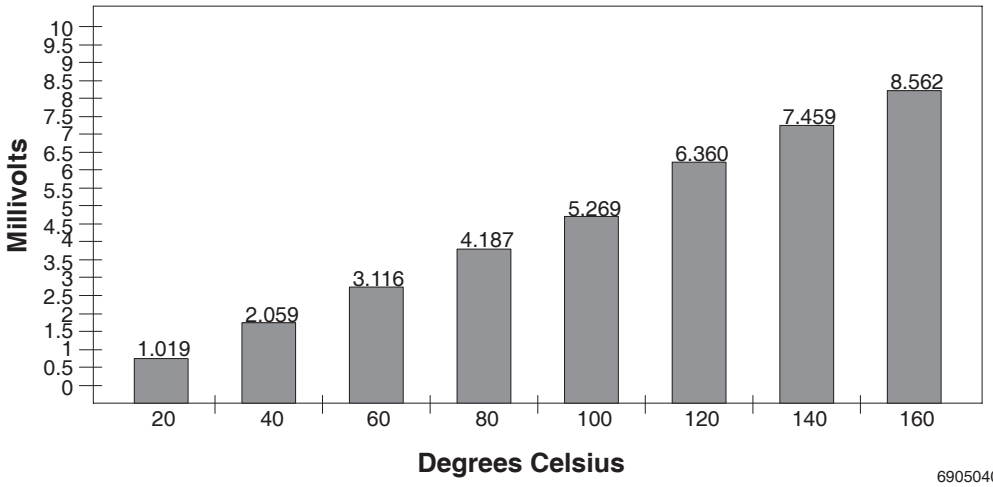
WARNING: Risk of personal injury or death. Allow only qualified personnel to perform electrical installation, troubleshooting, or repair procedures. Before performing any electrical procedure, review Section 1, *Safety*, and disconnect and lock out electrical power to the system.

Problem	Possible Cause	Corrective Action
1. Applicator does not heat	System power not on	Verify that the system power is turned on.
	Loose electrical connections	Verify that all electrical connections (cordsets and cables) are secure.
	Broken or missing pins or damaged cordset connectors	Check for broken or missing pins or damaged connectors at all electrical connections. Repair or replace damaged components.
	Adhesive or air temperature setpoints too low	Adjust the temperature setpoints as necessary. Refer to the melter or temperature controller manual.
2. Unstable temperature or pressure readings	Loose electrical connection	Verify that all electrical connections (cordsets and cables) are secure.
	Incorrect PID (proportional, integral, derivative) settings or incorrect type of control system or controller used to operate applicator	Adjust PID settings as needed. Refer to the manual for the control system or controller being used. To ensure proper temperature and pressure control, use the Nordson Universal slice controller to operate the applicator.
3. Applicator underheats or overheats	Adhesive or air temperature setpoints too low or too high	Adjust the temperature setpoints as necessary. Refer to the melter or temperature controller manual.
	Failed heater or sensor (RTD or thermocouple)	Check the resistance of the suspect heater or sensor. Refer to *Wiring Diagrams* in Section 9, *Technical Data*, for cordset pin diagrams.
		To determine what the resistance of a heater should be, use the following formula: $V^2 \div W = R$ (where V=voltage, W=wattage, and R=resistance). Refer to *Heater Wattages* in Section 9, *Technical Data*, for heater wattages.

Continued...

Problem	Possible Cause	Corrective Action
3. Applicator underheats or overheats *(contd.)*	Failed heater or sensor (RTD or thermocouple) *(contd.)*	The resistance of a 100-ohm sensor should be 100 ohms. The resistance of a 120-ohm sensor should be 120 ohms. The resistance of a J-type thermocouple should be 0. If the resistance is not 0, check the millivoltage of the suspect thermocouple and see Figure 6-1 to determine whether the thermocouple has the correct millivoltage value. Replace failed components as necessary. Refer to Section 7, *Repair*, for heater and sensor replacement procedures.
	Incorrect PID settings or incorrect type of control system or controller used to operate applicator	Adjust PID settings as needed. Refer to the manual for the control system or controller being used. To ensure proper temperature and pressure control, use the Nordson Universal slice controller to operate the applicator.

Degrees C	Millivolts
20	1.019
40	2.059
60	3.116
80	4.187
100	5.269
120	7.459
140	6.360
160	8.562



690504004W

Figure 6-1 Correct millivoltage values for J-type thermocouples

Adhesive Output Problems

Problem	Possible Cause	Corrective Action
1. Adhesive output too low or too high	Adhesive or air temperature setpoints too low or too high	Adjust the temperature setpoints as necessary. Refer to the melter or temperature controller manual.
	Melter not supplying correct amount of adhesive	Troubleshoot and correct the adhesive supply problem from the melter. The melter should be supplying about 20 percent more adhesive than the applicator requires. Refer to *Supply Pressure Adjustment* in Section 3, *Installation*.
	Blockage in hose-to-applicator or hose-to-melter connection	Check for blockages in the connections. Check also for a cold connection. Install insulation around any cold connections. If the adhesive output does not improve, install a heated inline filter at the connection.
	Clogged filter basket	Replace the filter basket. Refer to *Filter Basket Replacement* in Section 5, *Maintenance*.
	Blockage in module or nozzle	Check for blockage in the module or nozzle.
	Contaminated air supply	Ensure that the applicator is being supplied with dry, regulated, unlubricated air.
	Ruptured rupture disk **NOTE:** *Rupture Disk Replacement* in Section 7, *Repair*, describes the operational factors that can cause a rupture disk to rupture.	Replace the rupture disk. Refer to *Rupture Disk Replacement* in Section 7, *Repair*.
2. No adhesive output	Adhesive not at application temperature	Wait for the system to reach application temperature.
	Adhesive or air temperature setpoints too low or too high	Adjust the temperature setpoints as necessary. Refer to the melter or temperature controller manual.
	Adhesive level in melter low	Add adhesive to the melter. Refer to the melter manual.

Continued...

Problem	Possible Cause	Corrective Action
2. No adhesive output *(contd.)*	Blockage in hose-to-applicator or hose-to-melter connection	Check for blockages in the connections. Check also for a cold connection. Install insulation around any cold connections. If the adhesive output does not improve, install a heated inline filter at the connection.
	Clogged filter basket	Replace the filter basket. Refer to *Filter Basket Replacement* in Section 5, *Maintenance*.
	Module stem stuck in closed position; debris or char preventing stem movement	Replace the module with a new or rebuilt module. Refer to the module documentation.
	Module piston seal worn out	Replace the module with a new or rebuilt module. Refer to the module documentation.
	Adhesive or debris in module piston bore	Replace the module with a new or rebuilt module. Refer to the module documentation. **NOTE:** To prevent the migration of adhesive into the air supply, ensure that there is no adhesive on the manifold face when a module is replaced.
	Failed solenoid valve	Check the solenoid valve and replace as needed. Refer to *Solenoid Valve Replacement* in Section 7, *Repair*.
	Failed or faulty solenoid valve triggering device	Troubleshoot the triggering device. Refer to the triggering device documentation.
	Ruptured rupture disk **NOTE:** *Rupture Disk Replacement* in Section 7, *Repair*, describes the operational factors that can cause a rupture disk to rupture.	Replace the rupture disk. Refer to *Rupture Disk Replacement* in Section 7, *Repair*.

Continued...

Adhesive Output Problems *(contd)*

Problem	Possible Cause	Corrective Action
3. Adhesive output cannot be shut off	Module stem stuck in open position; debris or char preventing stem movement	Replace the module with a new or rebuilt module. Refer to the module documentation.
	Module piston seal worn out	Replace the module with a new or rebuilt module. Refer to the module documentation.
	Adhesive or debris in module piston bore	Replace the module with a new or rebuilt module. Refer to the module documentation. **NOTE:** To prevent the migration of adhesive into the air supply, ensure that there is no adhesive on the manifold face when a module is replaced.
4. Adhesive applied when it should not be or no adhesive applied when it should be	Solenoid valve not configured for the correct operation (normally closed vs. normally open)	Change to a solenoid valve configured with the appropriate operation (normally open or normally closed). **NOTE:** Snuff-back modules require the use of a valve configured for normally closed operation. All other modules required the use of a valve configured for normally open operation.
	Failed or faulty solenoid valve triggering device	Troubleshoot the triggering device. Refer to the triggering device documentation.

Adhesive Leakage Problems

CAUTION: Operation of the applicator motor in the wrong direction for extended periods of time will severely damage the applicator, causing general O-ring and seal failure and leakage at various points throughout the applicator. To ensure that the motor is operating in the correct direction, refer to *Motor Rotational Check* in Section 7, *Repair*.

Problem	Possible Cause	Corrective Action
1. Leaks at various connecting points in the system	Insufficient torque on bolts or screws	Tighten bolts and screws where leakage is occurring
	Damaged or worn O-rings or seals	Replace O-rings or seals as needed. Refer to *Pump and Drive O-Ring and Seal Replacement* in Section 7, *Repair*.
2. Leaks at pump	Damaged or worn pump O-rings and/or seals	Replace the pump O-rings and seals. Refer to *Pump and Drive O-Ring and Seal Replacement* in Section 7, *Repair*.
3. Leaks between a module the manifold	Insufficient torque on module screws	Tighten the module screws to 3–4 N•m (25–32 in.-lb).
	Damaged or worn O-rings on back of module	Replace the O-rings. Refer to the module documentation.
4. Leaks from bleed holes on modules	Failed O-rings/seals in module (O-rings/seals used beyond expected life)	Replace the module with a new or rebuilt module. Refer to the module documentation.
	System pressure too high	Adjust the system pressure. **NOTE:** To prevent this condition, regularly check for nozzle clogging.
5. Leaks at nozzle	System pressure too high	Decrease the system pressure. Refer to the melter manual.
	Damaged or worn O-ring in module seat	Replace the O-ring. Refer to the module documentation.
6. Leaks at hose connection	Loose hose connection	Tighten the connection.
	Failed hose fitting O-ring	Replace the hose fitting O-ring.

Pump and Drive Problems

Problem	Possible Cause	Corrective Action
1. Motor stops or fails to start	System power not on	Verify that the system power is turned on.
	System ready condition not reached	Wait until the system ready condition is reached.
	Loose line speed tachometer wiring connections	Check the wiring connections.
	Failed motor	Measure the resistance across the motor windings. If the circuit is open, replace the motor.
	Motor overtemperature alarm activated	Troubleshoot the motor.
	Problem in on/off circuit	Check for loose wiring or defective switches.
	Problem in motor controller	Troubleshoot the motor controller.
2. Pump not turning (motor running)	Broken key	Replace the key.
	Pump binding	Contact your Nordson representative.
3. Excessive torque in drive system	Plugged output at one or more positions	Check the hose for blockage. Check the manifold for output.
	Adhesive not at operating temperature when pump started	Increase temperature setpoints to the normal settings. Avoid starting the pump at below-normal temperature settings.
	Pump binding or locking up	Replace the pump. Refer to *Pump Replacement* in Section 7, *Repair*.

Air Supply Problems

Problem	Possible Cause	Corrective Action
1. Module-actuating air leaking	Failed piston seal inside module	Replace the module with a new or rebuilt module. Refer to the module documentation.
	Failed solenoid valve (solenoid valve used beyond expected life)	Check the solenoid valve and replace if necessary. Refer to *Solenoid Valve Replacement* in Section 7, *Repair*.
	Gasket on solenoid valve block-off plate damaged or installed incorrectly	Inspect the gasket and replace as needed. **NOTE:** To prevent this condition, ensure that gaskets are properly seated and that the block-off plate screws are tightened to the correct torque specification.
2. No module-actuating air	Failed solenoid valve (solenoid valve used beyond expected life)	Check the solenoid valve and replace if necessary. Refer to *Solenoid Valve Replacement* in Section 7, *Repair*.
	Failed air pressure regulator or insufficient air supply to the regulator	Check the regulator and the air supply to the regulator.
3. No pattern air	Failed air pressure regulator or insufficient air supply to the regulator	Check the regulator and the air supply to the regulator.
	Clogged air passage in nozzle	Clean or replace the nozzle. Refer to the module documentation.

Pattern Control Problems

Refer to the module documentation.

Section 7
Repair

WARNING: Allow only personnel with appropriate training and experience to operate or service the equipment. The use of untrained or inexperienced personnel to operate or service the equipment can result in injury, including death, to themselves and others, and damage to the equipment.

Introduction

This section provides selected service procedures for the slice applicator. You may need to perform one or more of these procedures if a component has failed or as part of a preventive maintenance program. Follow these guidelines when performing any service activity:

- Have the required tools, supplies, and replacement parts on hand. They are listed at the beginning of each service procedure. Refer to Section 8, *Parts*, for component part numbers.

  NOTE: A slice applicator service tool kit is available. Refer to *Tools and Supplies* in Section 8, *Parts*.

- Relieve system pressure and/or disable the applicator as appropriate before performing any service activity. Refer to Section 1, *Safety*.

The procedures in this section are in order from the most commonly performed to the least commonly performed. Table 7-1 explains the usage of each procedure.

Introduction *(contd)*

Table 7-1 Repair Procedures in this Section

Procedure	Usage
Heater Replacement	Use to replace a failed adhesive or air heater.
Fixed-Depth Sensor Replacement	Use to replace a failed fixed-depth adhesive or air temperature sensor.
Immersion Sensor Replacement	Use to replace a failed immersion sensor.
Solenoid Valve Replacement	Use to replace a failed solenoid valve.
Pump Replacement	Use to replace a failed pump or to change a pump from one size to another.
Rupture Disk Replacement	Used to replace a failed rupture disk on a pump.
Pump and Drive O-Ring and Seal Replacement	Usually performed as part of routine preventive maintenance to replace all pump and drive O-rings and seals on the applicator.
Applicator Disassembly, Cleaning, Lapping, and Reassembly	Used when a complete rebuild of the applicator and O-ring/seal replacement is required, usually every two to three times that routine preventive maintenance is performed.
Standard Pressure Transducer Replacement or *Miniature Pressure Transducer Replacement*	Used to replace a failed pressure transducer.
Applicator Hand Changeover and *Motor Rotational Check*	Used to move the motor and reducer assembly from one side of the applicator to the other.
Field-Installation of Optional Equipment	Used to field-install optional equipment, such as a pressure transducer, where none previously existed.
Manifold-Mounted to Flange-Mounted Solenoid Valve Conversion	Used to convert the modules on an applicator from the manifold-mounted solenoid valve type to the UM3 flange-mounted solenoid valve type.

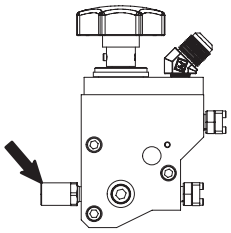
Preparation for Repairs

Before you can safely proceed with many of the maintenance, troubleshooting, and repair procedures in this manual, you will need to disable the applicator to prevent unwanted restarts and/or electrical hazards from occurring during performance of a procedure.

This procedure includes all the steps necessary to completely disable the applicator both hydraulically and electrically. It is not necessary to perform all of these steps for some procedures, so at the beginning of each procedure the preparatory steps recommended by Nordson are noted. Refer to this procedure as needed for more detail.

NOTE: Refer to Section 1, *Safety*, for a complete list of the warnings associated with Nordson equipment.

1. Disable the applicator pumps by locking out the motor control to prevent any unwanted restarts before this procedure is completed.
2. Disable the applicator by locking out the heat control to prevent electrical hazards.
3. Relieve pressure from the applicator by turning the drain valve screw (located on the front of the filter block) one turn counterclockwise.
4. Place drain pans under the modules and energize the solenoid valves to open the modules, relieving any residual pressure between the pumps and modules.
5. When adhesive stops flowing from the modules, stop energizing the solenoid valves.
6. Shut off the air supplies (module-actuating air and pattern air) to the solenoid valves.
7. Disable the power supply to the solenoid valves.



Applicator drain valve

Heater Replacement

Use this procedure to replace an adhesive heater or air heater. Heaters are removed from the filter block end of the applicator. You will need the following items:

- replacement adhesive or air heater
- standard and metric wrench set

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control	●	
Relieve pressure		●
Disable the solenoid valve power supply		●
Shut off the module-actuating air supply		●
Shut off the pattern air supply		●
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

2. Disconnect the heater cordset.
3. See Figure 7-1. Using an M3 hex wrench, remove the screw (1) that secures the heater to be replaced and then carefully remove the heater (2).
4. Carefully insert the new heater until it is completely seated and use an M3 hex wrench to tighten the screw that secures the heater.
5. Connect the new heater cordset and restore the system to normal operation.

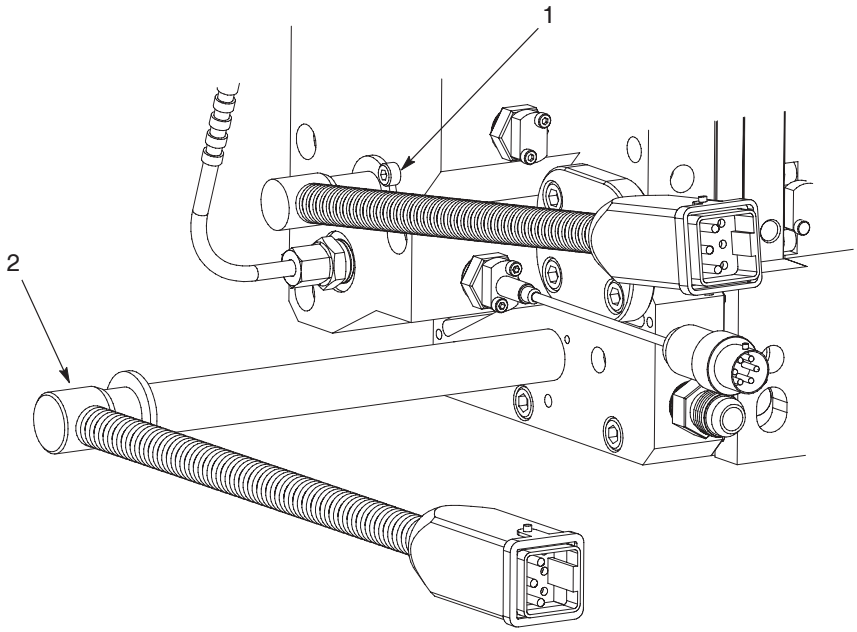


Figure 7-1 Removing a heater

1. Heater securing screw
2. Heater being removed

Fixed-Depth Sensor Replacement

Use this procedure to replace a fixed-depth adhesive or air temperature sensor. Fixed-depth sensors may be located in either end slice. You will need the following item:

- replacement fixed-depth sensor

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control	●	
Relieve pressure		●
Disable the solenoid valve power supply		●
Shut off the module-actuating air supply		●
Shut off the pattern air supply		●
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

2. Disconnect the sensor cordset.
3. See Figure 7-2. By hand, turn the bayonet-style cap (2) that secures the sensor (1) one-quarter turn counterclockwise and then remove the sensor.

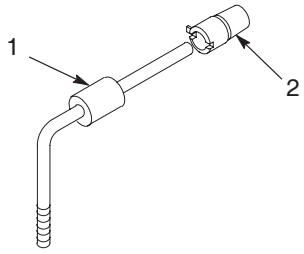


Figure 7-2 Fixed-depth sensor components

1. Sensor
2. Bayonet-style cap

4. Install the new sensor and secure it with the knurled cap.
5. Connect the new sensor cordset and restore the system to normal operation.

This page intentionally left blank.

Immersion Sensor Replacement

Use this procedure to replace an immersion sensor. The immersion sensor is located in the filter block. You will need the following items:

- replacement immersion sensor
- standard and metric wrench set

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control **NOTE:** Verity with a qualified electrician that leaving the heat control on for this procedure will not create an electrical hazard when the sensor is disconnected.		
Relieve pressure	●	
Disable the solenoid valve power supply		●
Shut off the module-actuating air supply		●
Shut off the pattern air supply		●
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

2. Disconnect the sensor cordset.
3. See Figure 7-3. Using a $^{7}/_{16}$-in. hex wrench, remove the sensor by unscrewing the nut and ferrule that secure the sensor to the fitting. The ferrule will be retained on the sensor.

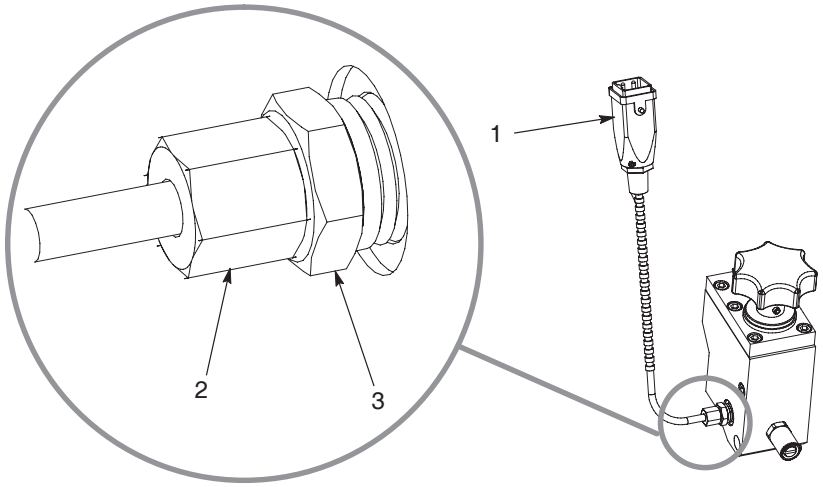


Figure 7-3 Immersion sensor components

1. Immersion sensor
2. Nut and ferrule
3. Fitting

4. If the existing fitting in the filter block is damaged, replace it with the new fitting from the service kit. You will need a $^{9}/_{16}$-in. hex wrench to replace the fitting.
5. Slide the new nut and ferrule from the service kit onto the new sensor.
6. Insert the new sensor into the filter block and adjust the depth of the sensor such that a minimum of 5 mm ($^{3}/_{16}$ in.) of the sensor barrel is exposed beyond the nut.
7. Use both the $^{7}/_{16}$-in. and $^{9}/_{16}$-in. hex wrenches to tighten the nut and ferrule on the fitting.
8. Connect the new sensor cordset and restore the system to normal operation.
9. If leakage occurs, retighten the compression fitting. If leakage continues, install a new fitting in the filter block.

Solenoid Valve Replacement

Use this procedure to replace a solenoid valve. You will need the following items:

- replacement solenoid valve
- standard and metric wrench set

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control		●
Relieve pressure		●
Disable the solenoid valve power supply	●	
Shut off the module-actuating air supply	●	
Shut off the pattern air supply		●
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

2. Disconnect the solenoid valve wiring.
3. See Figure 7-4. Using a 2.5-mm hex wrench, remove the solenoid valve mounting screws and then remove the solenoid valve and its heat isolation gasket.
4. Carefully align the heat isolation gasket and new solenoid valve on the applicator and use a 2.5-mm hex wrench to secure them.

   NOTE: Orientation of the solenoid valve is important. The solenoid valve electrical connector must be oriented toward the module side of the applicator.

Figure 7-4 Replacing a solenoid valve

5. Connect the new solenoid valve wiring and restore the system to normal operation.

Pump Replacement

Use these procedures to replace a pump. You will need the following items:

- O-ring and seal replacement kit
- standard and metric wrench set
- shaft puller (included in the slice applicator service tool kit)
- pump puller (included in the slice applicator service tool kit)
- rubber mallet or dead-blow hammer
- high-temperature anti-seize lubricant
- O-ring lubricant

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

Remove a Pump

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control		●
Relieve pressure	●	
Disable the solenoid valve power supply		●
Shut off the module-actuating air supply		●
Shut off the pattern air supply		●
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

Remove a Pump *(contd)*

2. See Figure 7-5. If applicable, remove the post-filter pressure transducer to allow access to the pump shaft end cap bolts.

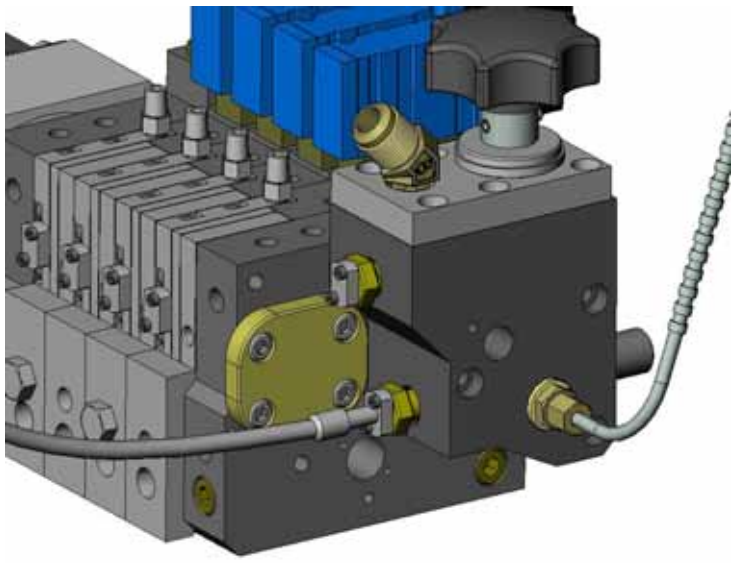


Figure 7-5 Location of the post-filter pressure transducer

3. See Figure 7-6. Use an M5 hex wrench to remove the four M5 pump shaft end cap screws and then remove the end cap.

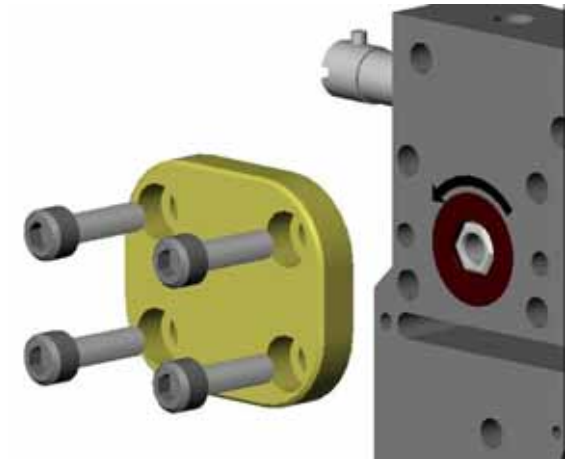
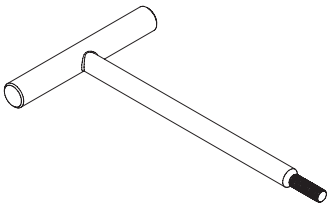


Figure 7-6 Removing the pump shaft end cap



Shaft puller

4. See Figure 7-7. Screw the shaft puller into the end of the pump shaft. When the puller is tight, pull it straight out without turning it. This will keep the hex receivers of all the pumps aligned.

   NOTE: If there is any cold adhesive in the applicator, you may need to use a heat gun.

   NOTE: After the pump shaft is removed, pumps can be replaced as desired. Pump sizes and part numbers are etched on the top surface of the pump—the pump size is to the right of the hyphen.

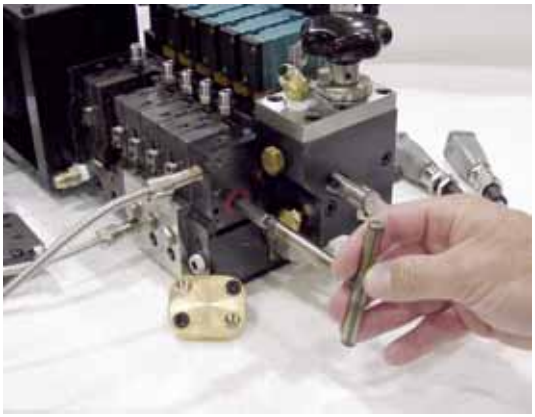


Figure 7-7 Using the shaft puller to remove the pump shaft

5. See Figure 7-8. Use a 13 mm hex or socket wrench to remove the pump clamp for the pump to be replaced.

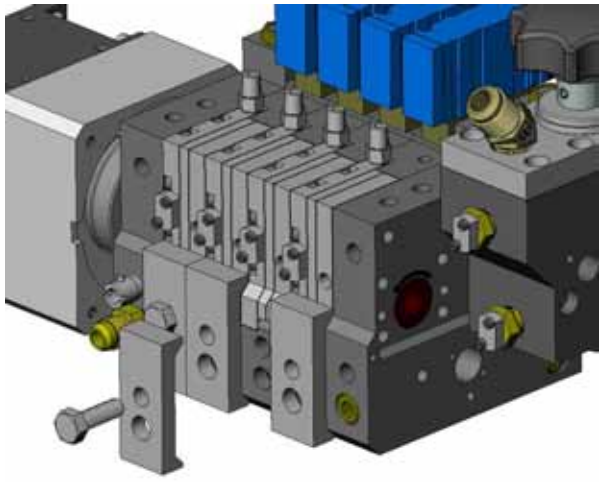


Figure 7-8 Removing a pump clamp

Remove a Pump *(contd)*

6. See Figure 7-9. Screw the pump puller into the threaded port provided on the back (clamp) side. Lightly tap the slide hammer against the rear of the pump puller to facilitate the removal of the pump assembly.

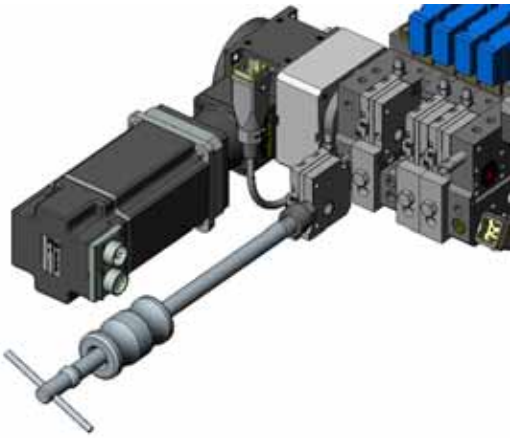


Figure 7-9 Using a pump puller to remove a pump

Install a Pump

1. Ensure that the face seal and all O-rings on the input and output ports are intact and in good condition. Replace as necessary. Use a light oil (non-silicone based) to ease installation as needed.
2. As you install the new pump assembly, put pressure inward and to the right to help compress the face seal on the adjacent pump assembly. This will help prevent any face seal damage to either pump during installation.
3. After the pump is past the face seal, tap the pump lightly with a rubber mallet to properly seat the pump assembly into position.

4. See Figure 7-10. When the pump is fully seated, reinstall the pump clamp and M8 hex screw. Tighten to 24–25 N•m (213–221 in.-lb).

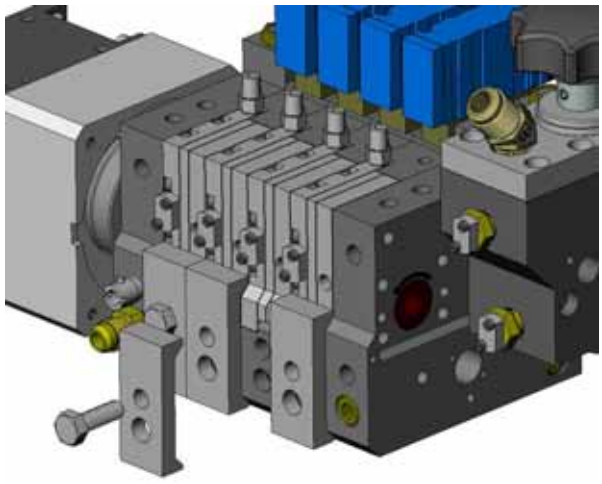
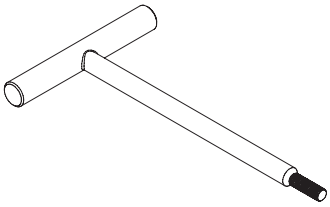


Figure 7-10 Installing a pump clamp



Shaft puller

5. See Figure 7-11. Reinstall the pump shaft. Turn the shaft slightly as you thread it through each slice to properly align the shaft to the hex receiver in each pump. Push the shaft in until it is flush with the end plate surface. Remove the shaft puller by turning it counterclockwise.

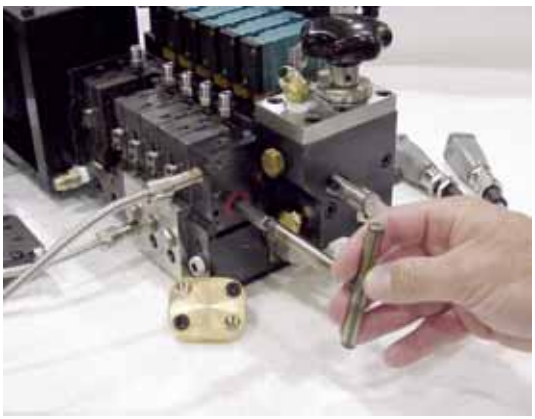


Figure 7-11 Using the shaft puller to install the pump shaft

Install a Pump *(contd)*

6. See Figure 7-12. When the pump shaft is in place, reinstall the pump shaft end cap.

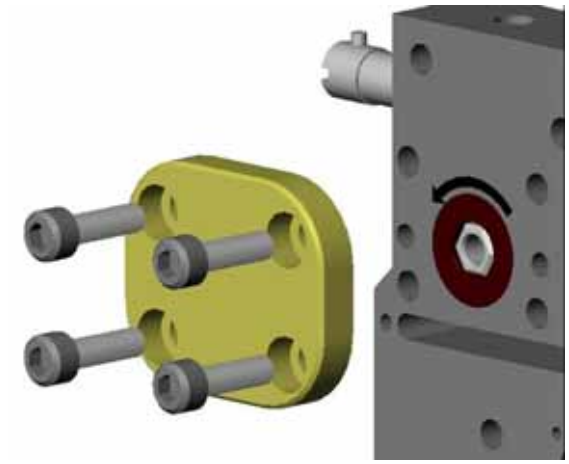


Figure 7-12 Installing the pump shaft end cap.

7. See Figure 7-13. If applicable, reinstall the post-filter pressure transducer.

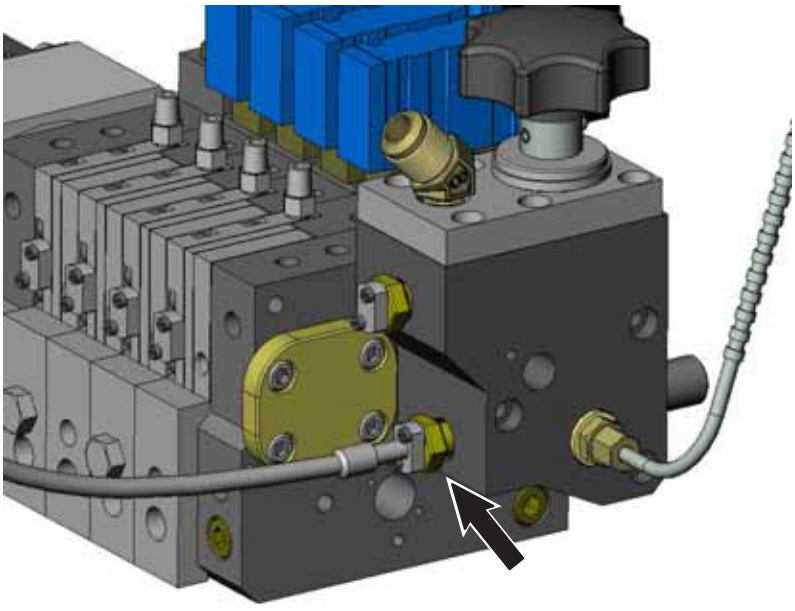


Figure 7-13 Location of the post-filter pressure transducer

8. Close the drain valve and restore the system to normal operation.
9. Perform an adhesive flow test to ensure that there are no leaks and that the correct flow is being produced.

Rupture Disk Replacement

You will need the following items:

- replacement rupture disks
- replacement modules
- replacement nozzles, if applicable
- standard and metric wrench set
- drain/collection pans

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

Overview

Rupture disks are safety devices installed in each slice applicator pump to prevent high-pressure situations. Operational factors that can cause the pressure in a slice applicator system to build to the point at which a rupture disk will rupture, thus relieving the pressure spike, include the following:

- nozzle clogging
- char or debris buildup in the applicator between the pump output and a module
- a recirculation port blocked with char or debris
- char or debris buildup inside a module
- startup of the pumps before the system has reaching the application temperature (in which chase the adhesive viscosity may be too high)

When a rupture disk bursts to prevent a high-pressure situation, follow the procedures below to mitigate the high-pressure situation and to replace the affected rupture disks and modules.

Stop the System

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control		●
Relieve pressure	●	
Disable the solenoid valve power supply	●	
Shut off the module-actuating air supply	●	
Shut off the pattern air supply	●	
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

2. Remove the nozzles from the modules on the affected slice positions and clean the nozzles for later use. Refer to the module documentation for nozzle cleaning and installation procedures as needed.

Remove the Rupture Disks and Flush the Applicator

1. Remove the modules from the affected slice positions by removing the two M4 cap screws. Refer to the module documentation as needed.
2. See Figure 7-14. Using a $^{7}/_{16}$-in. wrench, loosen and remove the rupture disks to be replaced.

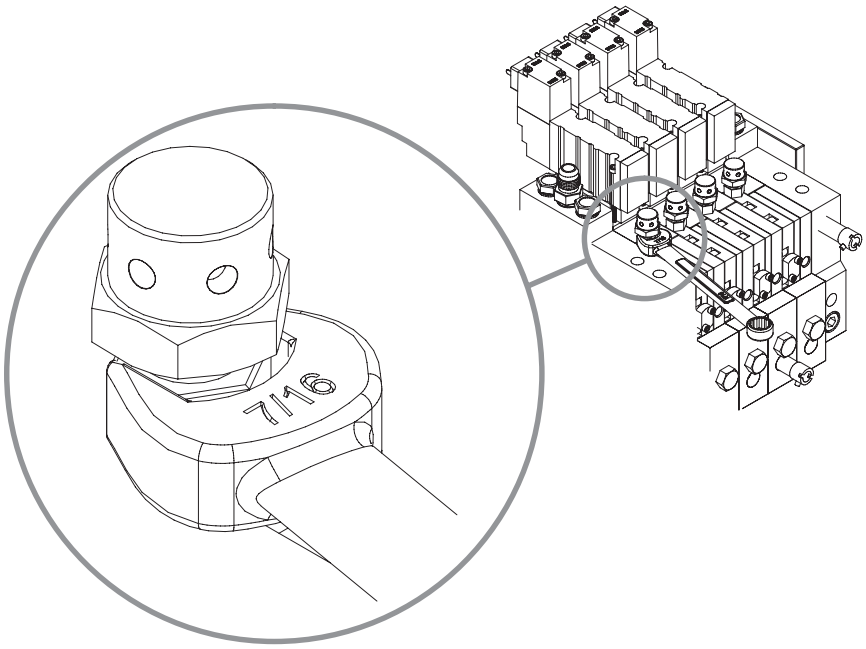


Figure 7-14 Removing a rupture disk

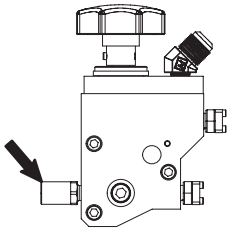
3. Install new rupture disks. Tighten the rupture disks to 5.6 N•m (50 in.-lb).
4. Close the drain valve.
5. Place a collection pan under the empty module positions.
6. Start the melter pump and run it at a speed that will feed 110% of the calculated flow being dispensed by the applicator, as indicated in step 7.
7. Run the applicator pumps at a predetermined slow speed (10–20 rpm).
8. Dispense adhesive to clear debris from the adhesive flow paths.

   NOTE: During this procedure, it is normal for adhesive to flow from both the adhesive output port and the adhesive recirculation port. Allowing adhesive to flow with the modules removed helps to ensure that both of these ports are adequately purged to prevent a subsequent rupture from occurring prematurely. Replacing the module and nozzle with clean module and nozzle (new or reused) further reduces this risk.

   NOTE: The adhesive recirculation port is connected to the pump inlet supply in order to return unused adhesive. Removing modules allows some of the input adhesive to the pumps to flow out of the module port. Accordingly, it is important to correctly calculate the melter overfeed (step 6) to ensure that the pumps will be properly lubricated with adhesive.

9. Stop the melter and applicator pumps.

Install New Components



Applicator drain valve

1. Relieve pressure from the applicator by turning the drain valve screw (located on the front of the filter block) one turn counterclockwise.
2. After adhesive has stopped flowing, ensure that mounting surfaces are clean and install new modules. Refer to the module documentation as needed.

CAUTION: Ensure that the nozzles to be installed are clean and free from debris in their orifices. Otherwise, additional/unexpected rupture disk failures may occur.

3. Install new and/or cleaned nozzles. Refer to the module documentation as needed.
4. Close the drain valve.
5. Re-establish the module-actuating air supply at its normal setting and restore the system to normal operation.

This page intentionally left blank.

Standard Pressure Transducer Replacement

Use these procedures to replace a standard ($^1/_2$-20) pressure transducer. Standard pressure transducers are installed only on the filter block. You will need the following items:

- replacement standard pressure transducer
- standard and metric wrench set
- O-ring lubricant

NOTE: To field-install a standard pressure transducer where none previously existed, refer to *Field-Install a Standard Pressure Transducer* under *Field Installation of Optional Equipment* later in this section.

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

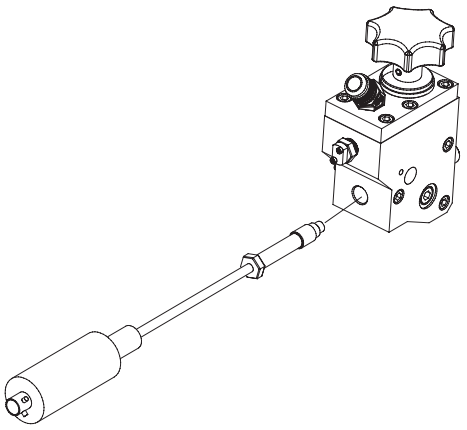
Remove the Standard Transducer

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control		●
Relieve pressure	●	
Disable the solenoid valve power supply		●
Shut off the module-actuating air supply		●
Shut off the pattern air supply		●
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

2. See Figure 7-15. Using a $^{5}/_{8}$-in. hex wrench, remove the transducer from the filter block.

   NOTE: Ensure that the transducer O-ring was removed along with the transducer.



421600023

Figure 7-15 Replacing a standard pressure transducer

Install the Standard Transducer

1. Apply O-ring lubricant to the transducer O-ring.
2. Carefully insert the transducer into the filter block and tighten it.
3. Restore the system to normal operation.

Miniature Pressure Transducer Replacement

Use these procedures to replace a miniature pressure transducer. Miniature pressure transducers are installed in pumps but may also be installed in the filter block. You will need the following items:

- replacement miniature pressure transducer
- standard and metric wrench set
- O-ring lubricant

NOTE: To field-install a miniature pressure transducer where none previously existed, refer to *Field-Install a Miniature Pressure Transducer* under *Field Installation of Optional Equipment* later in this section.

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

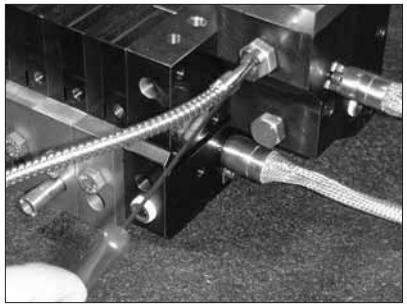
Remove the Miniature Transducer

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control		●
Relieve pressure	●	
Disable the solenoid valve power supply		●
Shut off the module-actuating air supply		●
Shut off the pattern air supply		●
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

2. See Figure 7-16 or 7-17 as appropriate. Using a 2.5-mm hex wrench, remove the transducer mounting screws and then carefully pull the transducer from the transducer adapter plug.

   NOTE: Ensure that the transducer O-ring was removed along with the transducer.



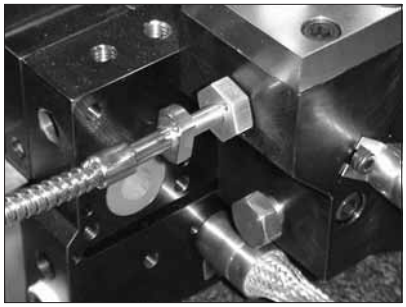


Figure 7-16 Removing a miniature pressure transducer from the filter block

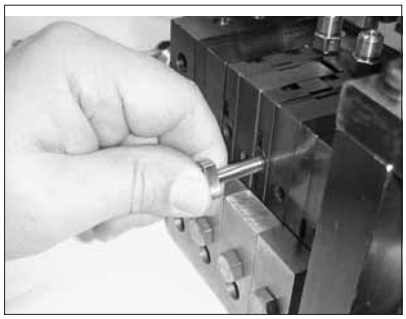


Figure 7-17 Removing a miniature pressure transducer from a pump

Installing a Miniature Transducer

1. Apply O-ring lubricant to the transducer O-ring.
2. Carefully insert the transducer into the adapter plug.
3. Align the mounting screw holes, thread the mounting screws into place, and tighten the screws.
4. Restore the system to normal operation.

Pump and Drive O-Ring and Seal Replacement

Use these procedures to replace all the pump and drive O-rings and seals. To save time, you may choose to do this type of rebuild instead of complete applicator disassembly, cleaning, lapping, and reassembly. You will need the following items:

- pump O-ring and seal replacement kit
- standard and metric wrench set
- pliers
- large flat-blade screwdriver
- rubber mallet or dead-blow hammer
- shaft puller (included in the slice applicator service tool kit)
- pump puller (included in the slice applicator service tool kit)
- 0.005-in. feeler gauge
- high-temperature anti-seize lubricant
- O-ring lubricant

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

Disassemble the Pump and Drive

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control		●
Relieve pressure	●	
Disable the solenoid valve power supply		●
Shut off the module-actuating air supply		●
Shut off the pattern air supply		●
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

2. See Figure 7-18. If applicable, use a $^{5}/_{8}$-in. wrench to carefully remove all pressure transducer(s) installed on the applicator.

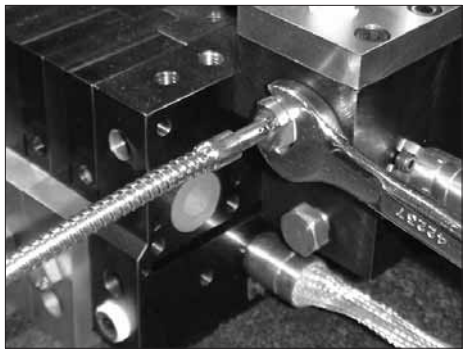


Figure 7-18 Removing a filter block pressure transducer

3. See Figure 7-19. Using an M5 hex wrench, remove the four hex bolts securing the pump shaft end cap and then remove the end cap.

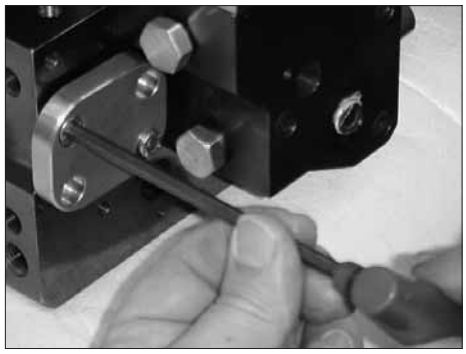
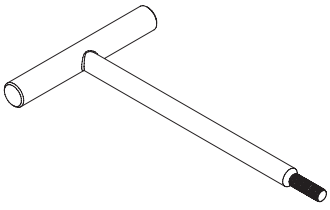


Figure 7-19 Removing the pump shaft end cap



Shaft puller

4. See Figure 7-20. Thread the shaft puller into the pump shaft and pull gently until the shaft is removed.

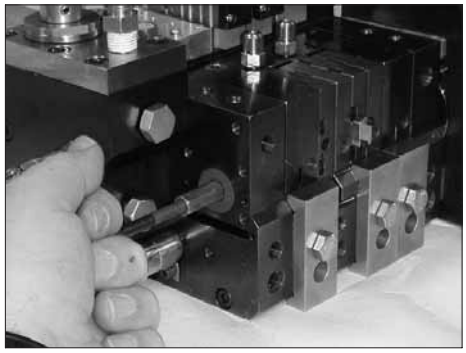


Figure 7-20 Using the shaft puller to remove the pump shaft

Disassemble the Pump and Drive *(contd)*

5. See Figure 7-21. Using an M5 hex wrench, remove the reducer/motor assembly from the applicator. Take note of the installation configuration of the reducer/motor assembly.

Figure 7-21 Removing the reducer/motor assembly

6. See Figure 7-22. Using an M4 hex wrench, remove the drive adapter (three shoulder bolts).

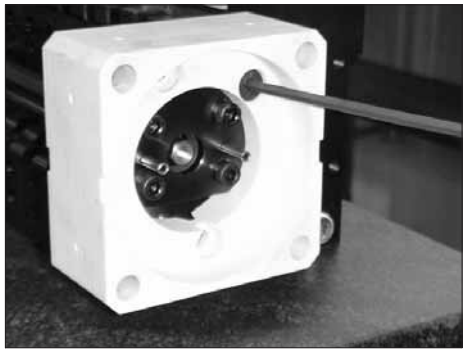


Figure 7-22 Removing the drive adapter

7. See Figure 7-23. Using an M5 hex wrench, remove the four pump packing assembly bolts and then remove the assembly.
8. Inspect the end-slice dowel pins for damage. If the pins are damaged, replace them using a dowel pin puller.

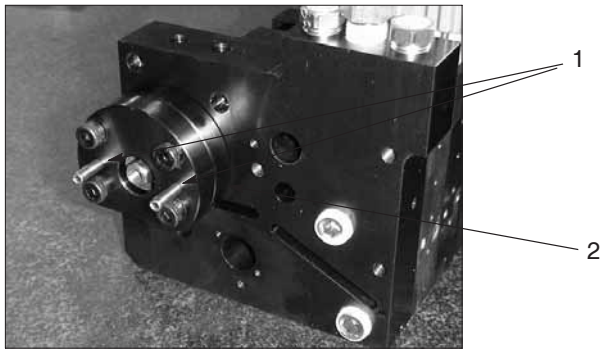


Figure 7-23 Location of the end-slice dowel pins

1. End-slice dowel pins
2. Pump packing assembly

9. See Figure 7-24. Separate the two halves of the pump packing assembly. Remove the pump packing assembly O-rings and spring seals (one per half) and discard.

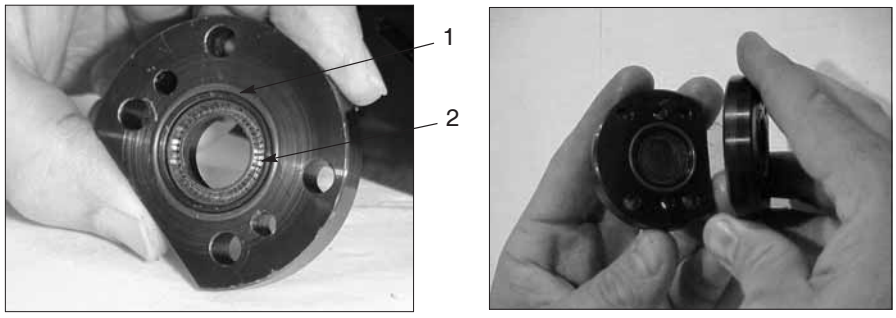


Figure 7-24 Removing the pump packing assembly O-rings and spring seals

1. O-ring
2. Spring seal

Disassemble the Pump and Drive *(contd)*

10. See Figure 7-25. After removing the temperature sensor, use a large flat-blade screwdriver to loosen the temperature sensor thermowell and then remove thermowell by hand.

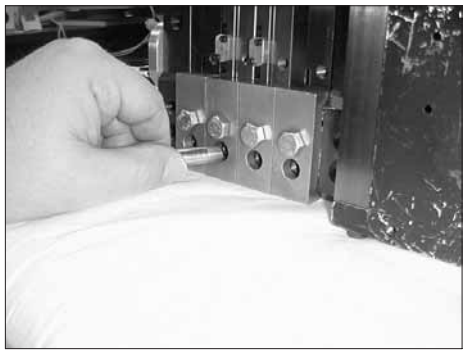
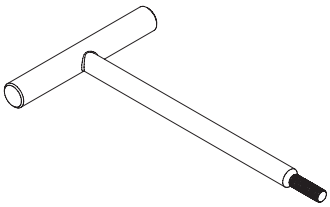


Figure 7-25 Removing a temperature sensor thermowell

11. Remove the pump. Refer to *Remove a Pump* earlier in this section.
12. Using an M5 hex wrench, remove the adhesive diverter plate by first removing its mounting bolt and then threading the shaft puller into the screw hole indicated in Figure 7-26.



Shaft puller

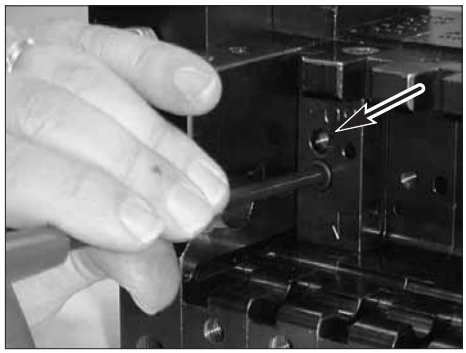


Figure 7-26 Using a hex wrench to remove an adhesive diverter plate and location of screw hole for inserting the shaft puller

NOTE: Prior to the installation of new O-rings and seals, ensure that all mating surfaces are clean and burr-free. Apply a light coat of high-temperature anti-seize lubricant to all mounting bolts. Apply a light coat of O-ring lubricant to all O-rings and seals.

13. See Figure 7-27. Replace the pump O-rings (2) and seal (1) and the adhesive diverter plate O-rings (3) with those supplied in the service kit.

    NOTE: It is very important that the beveled edge of the pump seal be facing outward toward the mating surface of the next pump.

    NOTE: For pump substitution blocks, use the O-rings supplied in the service kit.

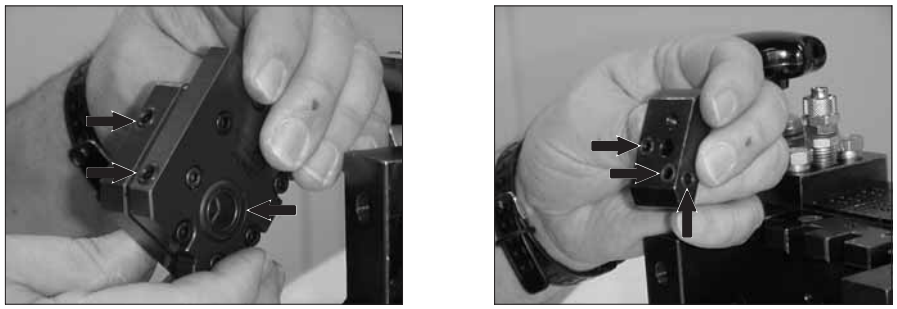


Figure 7-27 Location of the pump O-rings and seal and the adhesive diverter plate O-rings

Assemble the Pump and Drive

1. See Figure 7-28. Working from left to right, use an M5 hex wrench to install the adhesive diverter plates. Tighten the bolts to 10–12 N•m (89–106 in.-lb).

Figure 7-28 Installing an adhesive diverter plate

2. See Figure 7-29. When installing the last adhesive diverter plate, use a 0.005-in. feeler gauge over the side O-ring to “shoehorn” it into position.

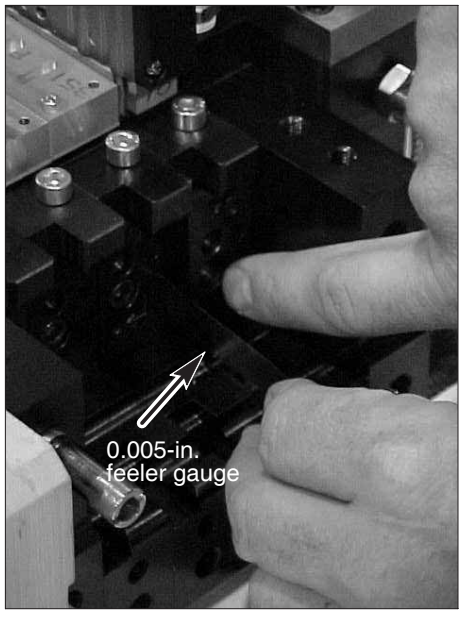


Figure 7-29 Using a feeler gauge to install the last adhesive diverter plate

3. See Figure 7-30. Install the pumps, working from right to left and ensuring that the pumps are completely seated.

   REMINDER! It is very important that each pump's seal be installed so that that the beveled edge is facing outward toward the mating surface of the next pump.

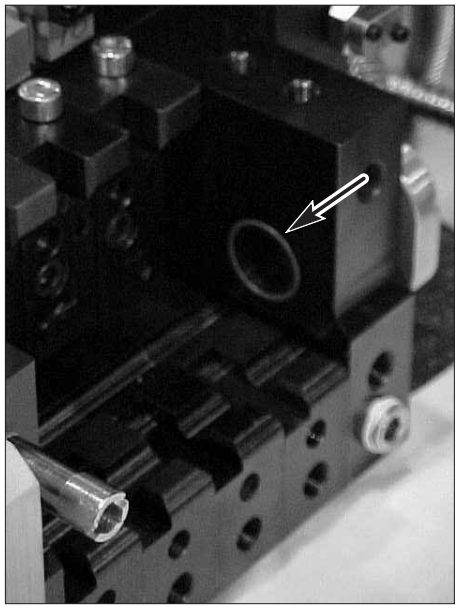


Figure 7-30 Location of the pump side seal

CAUTION: Excessive force used during pump insertion will damage the pump side seals.

4. See Figure 7-31. When installing the last pump, ensure that the pump side seal is fully inserted and flush with the pump surface. This will ease the installation and help prevent damage to the seal that could cause leakage. Installation may require *lightly* tapping the pump with a rubber mallet or dead blow hammer.

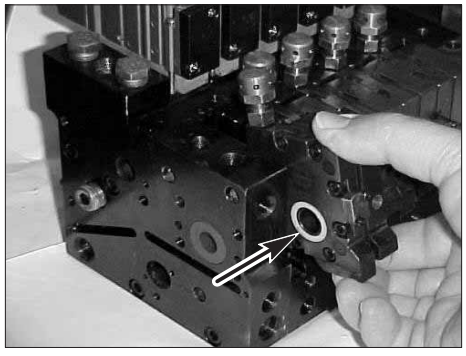


Figure 7-31 Location of the side seal on the last pump

Assemble the Pump and Drive *(contd)*

5. See Figure 7-32. Reinstall the pump clamps. Tighten the pump clamp bolts to 24–25 N•m (213–221 in.-lb).

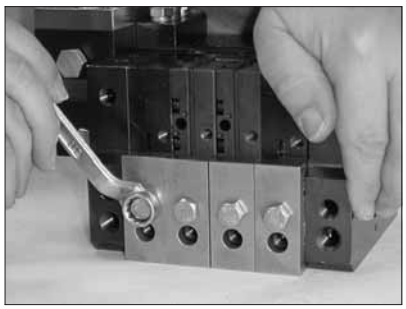


Figure 7-32 Installing a pump clamp

6. See Figure 7-33. Once pump clamps are tightened, install the temperature sensor thermowell(s) and tighten them with a large flat-blade screwdriver.

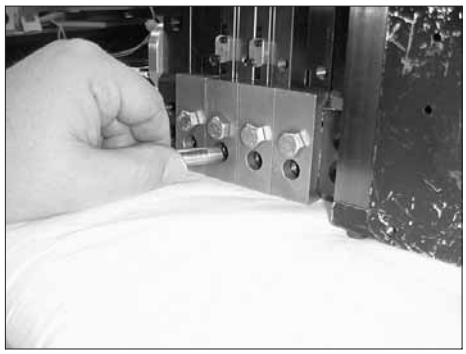


Figure 7-33 Installing a temperature sensor thermowell

7. See Figure 7-34. Slide the pump shaft assembly into the applicator. It may be necessary to slightly rotate the shaft in each direction while inserting it to fully seat the shaft.

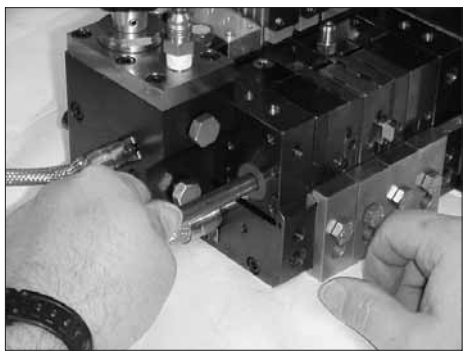


Figure 7-34 Installing the pump shaft

8. See Figure 7-35. Using an M5 hex wrench, install the pump shaft end cap. Tighten to 10–12 N•m (89–106 in.-lb).

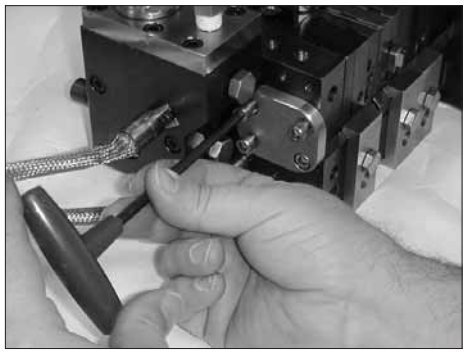


Figure 7-35 Installing the pump shaft end cap

9. See Figure 7-36. If applicable, use a $^{5}/_{8}$-in. wrench to install the pressure transducers until they are tight.

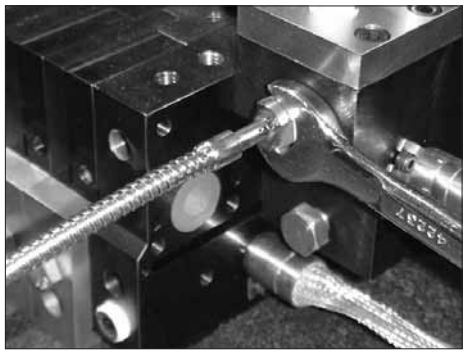


Figure 7-36 Installing a pressure transducer on the filter block (miniature transducer shown)

10. See Figure 7-37. Insert the new end-slice dowel pins supplied in the service kit. This may require light tapping with a hammer. Ensure that the pins remain straight during insertion. When correctly installed, the pins should be perpendicular to the slice.

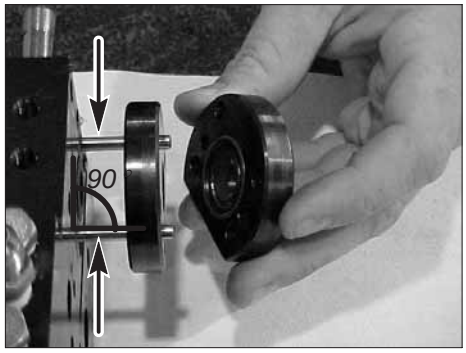


Figure 7-37 Installing the new end-slice dowel pins

Assemble the Pump and Drive *(contd)*

11. See Figure 7-38. After replacing the pump packing assembly O-rings and spring seals with the new ones in the service kit, install the pump packing assembly halves on the applicator by sliding them over the dowel pins (Figure 7-37) and then tightening them with an M5 hex wrench until they are snug.

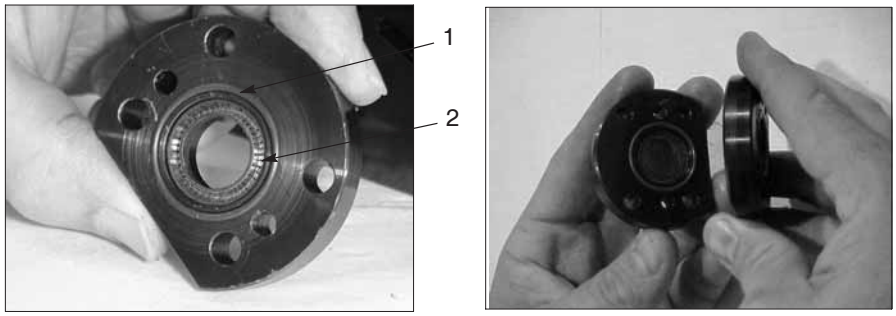


Figure 7-38 Pump packing assembly O-rings and spring seals

1. O-ring
2. Spring seal

12. See Figure 7-39. Using an M4 hex wrench, install the drive adapter (three shoulder bolts).

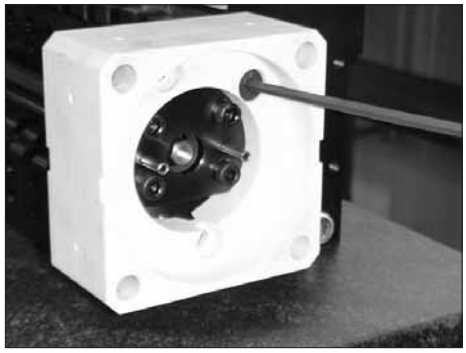


Figure 7-39 Installing the drive adapter

13. See Figure 7-40. Using an M5 hex wrench, install the reducer/motor assembly (four bolts). Make sure the reducer/motor assembly is installed in the same configuration it was in prior to disassembly.

Figure 7-40 Installing the reducer/motor assembly

14. Restore the system to normal operation.

Applicator Disassembly, Cleaning, and Lapping

Use these procedures to disassemble the applicator, clean it, prepare it for reassembly (lapping), and reassemble it. You will need the following items:

- replacement O-rings, seals, and other components as needed
- applicator-specific reference drawing
- standard and metric wrench set
- large screwdriver
- shaft puller (included in the slice applicator service tool kit)
- pump puller (included in the slice applicator service tool kit)
- alignment pins (included in the slice applicator service tool kit)
- rubber mallet or dead-blow hammer
- cleaning bath (preferably heated)
- method for lapping (refer to *Lap the Mating Surfaces*)
- O-ring lubricant
- high-temperature anti-seize lubricant
- PTFE tape

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

Disassemble the Applicator

Disassembling the applicator involves preparing for disassembly, removing the heaters, sensors, solenoid valves, pressures transducers (if present), motor and reducer, and disassembling the remaining components.

Preparation

Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control	●	
Relieve pressure	●	
Disable the solenoid valve power supply	●	
Shut off the module-actuating air supply	●	
Shut off the pattern air supply	●	
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

Remove the Heaters and Sensors

1. See Figure 7-41. Using an M3 hex wrench, remove the bolts that secure the heaters and then carefully remove the heaters.

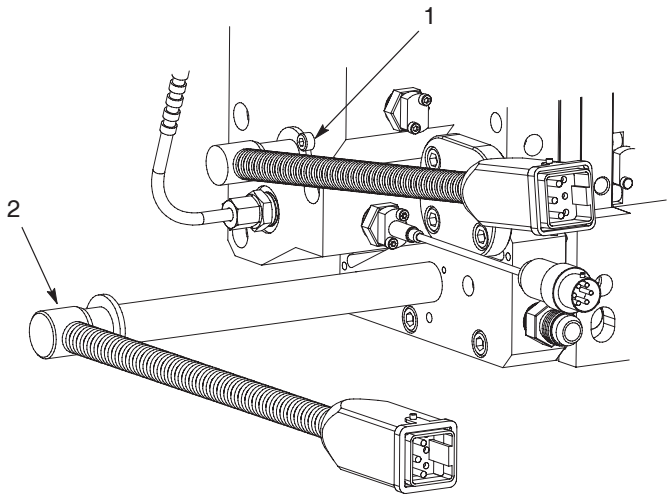


Figure 7-41 Removing a heater

1. Heater securing screw
2. Heater being removed

2. See Figure 7-42. Using a $^{7}/_{16}$-in. wrench, remove the rupture disks from the pumps.

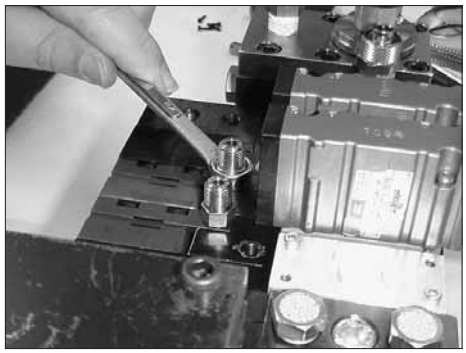


Figure 7-42 Removing a rupture disk

Remove the Heaters and Sensors *(contd)*

3. See Figure 7-43. Using a large screwdriver, loosen and then remove the temperature sensor thermowell(s) from the applicator.

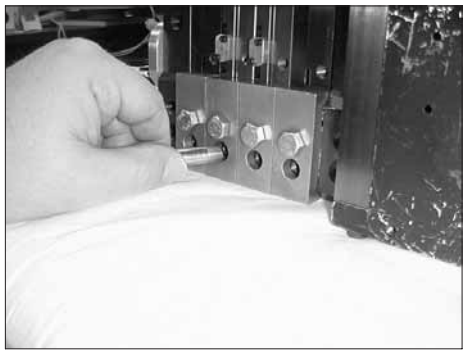


Figure 7-43 Removing a temperature sensor thermowell

Remove the Solenoid Valves and Transducers

1. See Figure 7-44. Using a 2.5-mm hex wrench, remove the solenoid valve mounting screws and then remove the solenoid valves and their heat isolation gaskets.

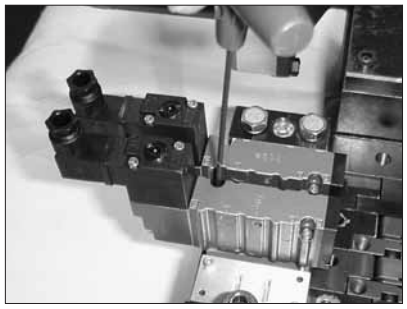


Figure 7-44 Removing solenoid valves

2. See Figure 7-45. Using a 2.5-mm hex wrench, remove all block-off plates.

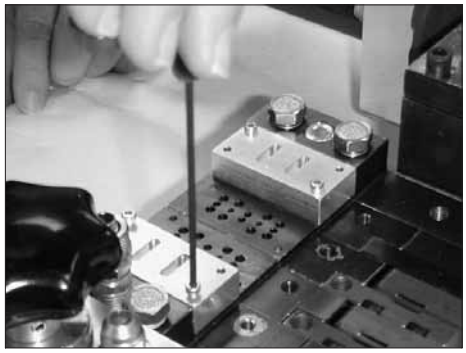


Figure 7-45 Removing block-off plates

3. See Figure 7-46. Using a 2.5-mm hex wrench, remove the pressure transducer plugs from the pumps.

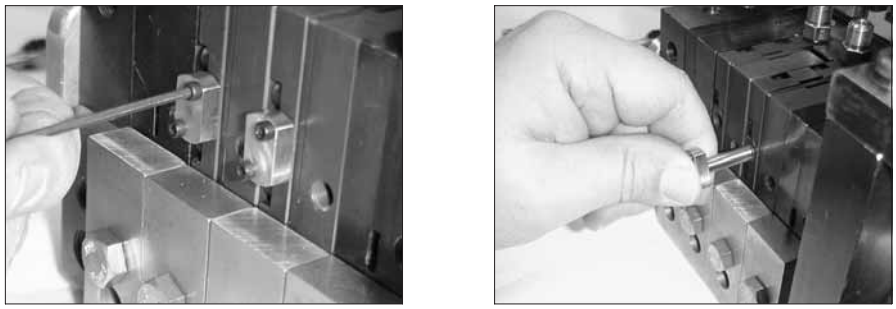


Figure 7-46 Removing pump pressure transducer plugs

Remove the Drive Components

1. See Figure 7-47. Using an M5 hex wrench, remove the reducer/motor assembly.

Figure 7-47 Removing the reducer/motor assembly

2. See Figure 7-48. Using an M4 hex wrench, remove the drive adapter (three shoulder bolts).

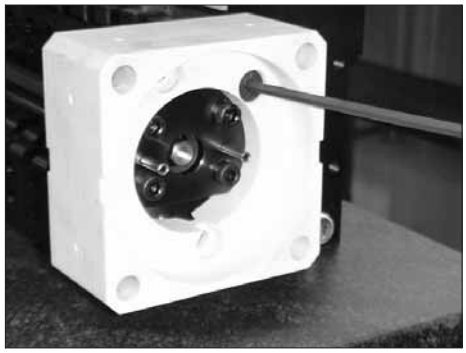


Figure 7-48 Removing the drive adapter

Remove the Drive Components *(contd)*

3. Using an M5 hex wrench, remove the pump packing assembly.
4. See Figure 7-49. Using an M3 hex wrench, loosen the set screw that secures the motor shaft to the reducer.

Figure 7-49 Removing the motor shaft set screw

5. See Figure 7-50. Using an M4 hex wrench, remove the motor from the reducer.

Figure 7-50 Removing the motor from the reducer

6. See Figure 7-51. Using an M5 hex wrench, remove the pump shaft end cap.

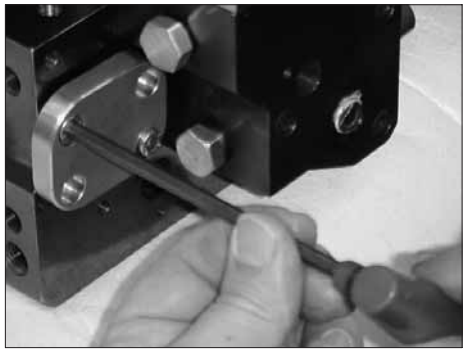


Figure 7-51 Removing the pump shaft end cap

7. See Figure 7-52. Remove the pump shaft support bearing.

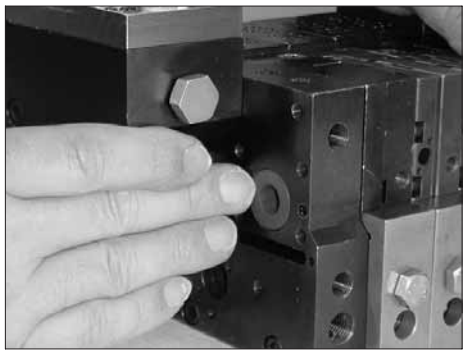
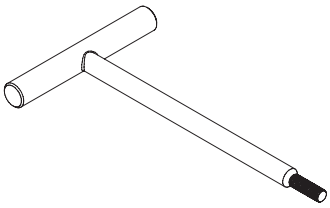


Figure 7-52 Removing the pump shaft support bearing



Shaft puller

8. See Figure 7-53. Using the shaft puller, remove the pump shaft by slightly rotating it in both directions while pulling.

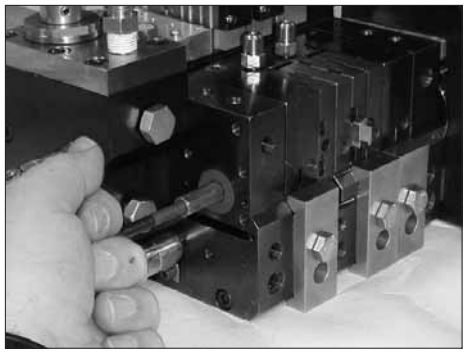


Figure 7-53 Using the shaft puller to remove the pump shaft

9. Remove the pumps. Refer to *Remove a Pump* earlier in this section.
10. See Figure 7-54. Using an M5 hex wrench, remove each adhesive diverter plate.

Figure 7-54 Removing adhesive diverter plates

Remove the Drive Components *(contd)*

11. See Figure 7-55. Remove the filter knob and basket from the filter block.

Figure 7-55 Removing the filter knob and filter basket

12. See Figure 7-56. Remove the various plugs and fittings.

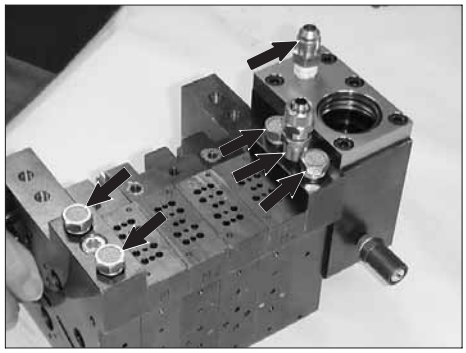


Figure 7-56 Various plugs and fittings

13. See Figure 7-57. Using an M5 hex wrench, remove the filter block cap.

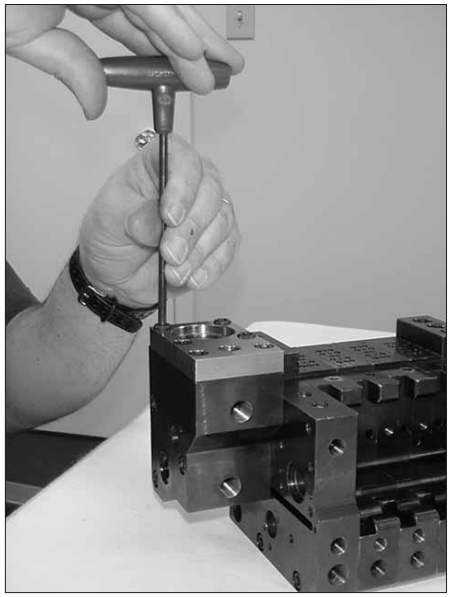


Figure 7-57 Removing the filter block cap

14. Using an M5 hex wrench, remove the filter block base.
15. Using an M5 hex wrench, remove the left end-plate.
16. Using an M5 hex wrench, continue removing slices until all are separated and removed.

Clean the Applicator

WARNING: Risk of explosion or fire. Any cleaning solution used must be approved for your facility and adhesive type. The solution must also have a flashpoint rated above the temperature to which it will be heated.

1. Place all slices in a cleaning solution bath heated to 38–66 °C (100–150 °F).
2. After removing the parts from the bath, inspect them for damage and ensure that they are clean.

Lap the Mating Surfaces

Before the applicator is reassembled, the mating surfaces of each slice must be flat and burr-free to ensure a good sealing surface. A process called “lapping” is utilized to accomplish this.

1. Depending on the availability of material, set up one of the following methods to perform the lapping process:
   - Prepare a granite surface plate with 600-grit sandpaper secured to the top surface of the plate.
   - Prepare an actual lapping plate with 600-grit lapping compound.

CAUTION: Too much pressure and/or too many strokes could result in excessive material removal.

2. For either lapping method, place a slice face down on the lapping surface and apply light, even pressure while moving the slice in a figure-eight pattern. Only a few figure-eight patterns are required to properly remove any burrs or high spots (raised material).
3. After lapping, clean the slice by re-rinsing it with solvent and then blowing off any final residue or debris with compressed air.
4. Repeat steps 2–3 for each slice.

Assemble the Applicator

Reassembly of the applicator involves reversing the actions performed to disassemble the application along with replacement of components as needed.

Assemble the End Plate and Slices

1. See Figure 7-58. Begin assembly with the two end slices (in reverse placement) supported by the alignment pins**.**

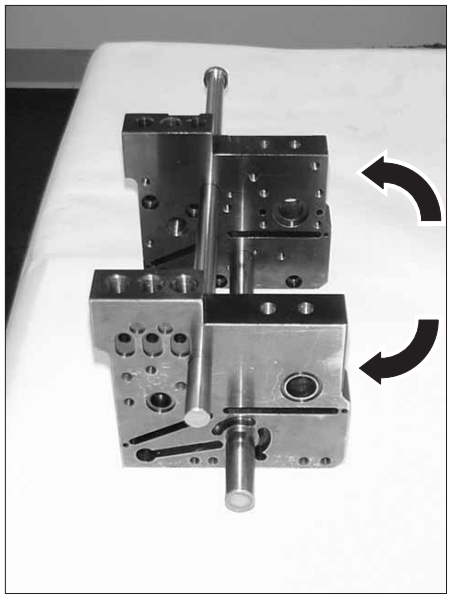


Figure 7-58 Aligning the end slices

2. See Figure 7-59. Install new end slice O-rings.

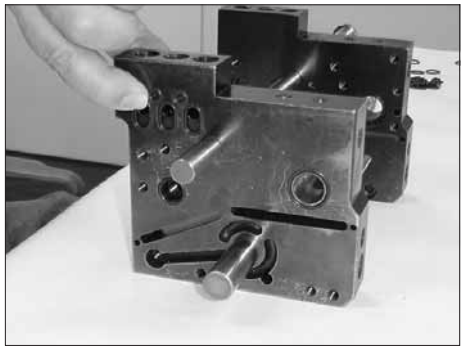


Figure 7-59 Location of end slice O-rings

Assemble the End Plate and Slices *(contd)*

3. See Figure 7-60. Install new O-rings in the appropriate positions on all inner slices.

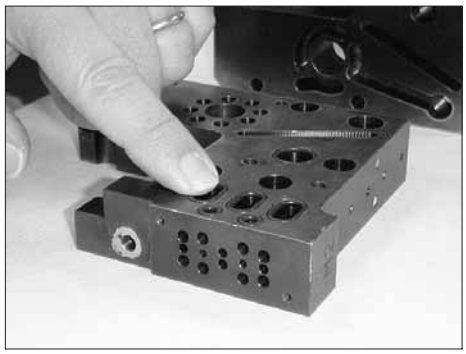


Figure 7-60 Location of inner slice O-rings

4. See Figure 7-61. Starting with the inner slices, assemble the applicator by sliding the slices over the alignment pins as follows:
   - On an applicator with an even number of slices, start with slice stamped M1.
   - On an applicator with an odd number of slices, start with the slice stamped M2.

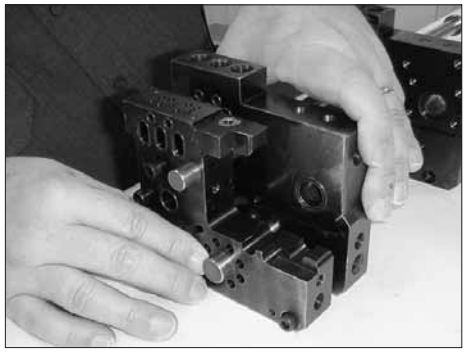


Figure 7-61 Assembling inner slices

5. See Figure 7-62. Apply anti-seize lubricant and place the four M5 bolts in each slice. Tighten each to 10.7 N•m (95 in.-lb). Continue adding slices, alternating part numbers, until the desired configuration is achieved.

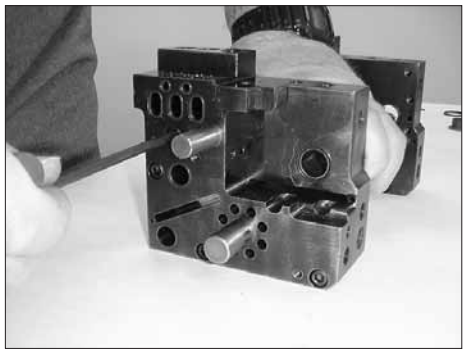


Figure 7-62 Tightening inner slice bolts

6. See Figure 7-63. Remove the alignment pins and the left-end slice from the assembly. Reinsert the alignment pins and move the left-end slice over the last installed inner slice. Install the right-end slice after the last inner slice has been placed.

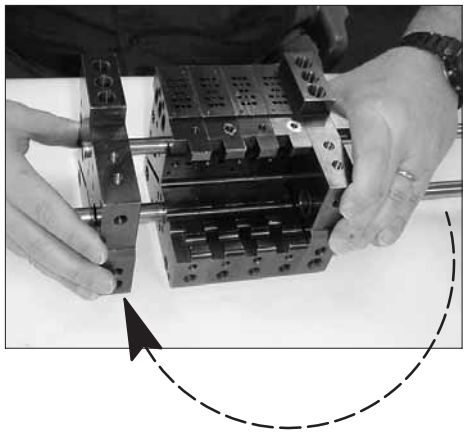


Figure 7-63 Moving the left-end slice

Assemble the End Plate and Slices *(contd)*

7. See Figure 7-64. Using an M5 hex wrench, secure the left-end slice to the assembly. Tighten the bolts to 12.4 N•m (110 in.-lb).

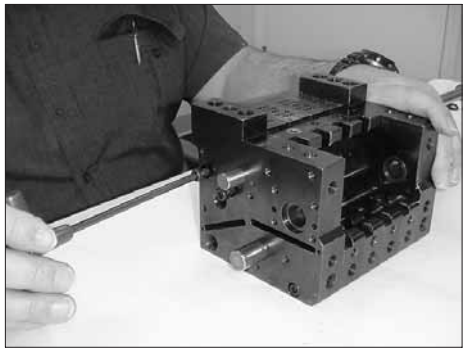


Figure 7-64 Securing the left-end slice

Install the Filter Block

1. See Figure 7-65. Using the heater as an alignment tool, attach the filter block base to the applicator using an M5 hex wrench. Tighten the bolts to 12.4 N•m (110 in.-lb).

   NOTE: Ensure that the O-rings are in place on the left-end slice prior to installing the filter block base.

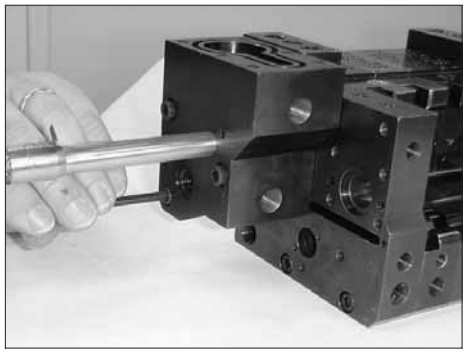


Figure 7-65 Installing the filter block base

2. See Figure 7-66. Install the filter block base O-ring.

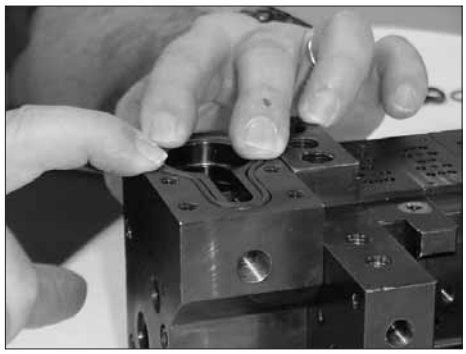


Figure 7-66 Location of the filter block base O-ring

3. See Figure 7-67. Using an M5 hex wrench, install the filter block cap. Tighten the bolts to 12.4 N•m (110 in.-lb).

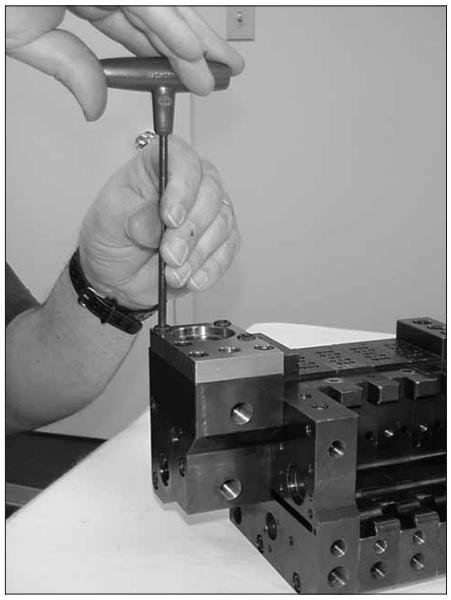


Figure 7-67 Installing the filter block cap

Install the Filter Block *(contd)*

4. See Figure 7-68. Using a $^1/_4$-in. wrench, install and tighten the filter block transducer plugs.

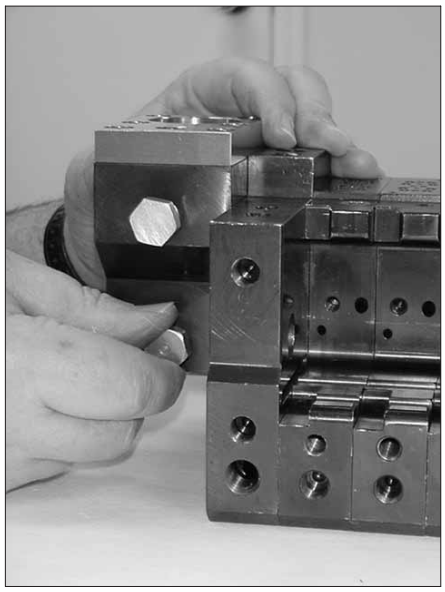


Figure 7-68 Installing the filter block transducer plugs

5. See Figure 7-69. Using PTFE tape, install the various plugs and fittings.

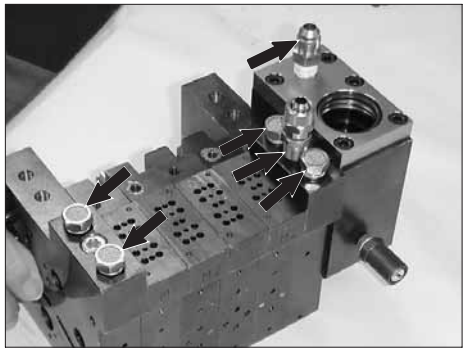


Figure 7-69 Various plugs and fittings

6. See Figure 7-70. Insert the filter basket and knob in the filter block.

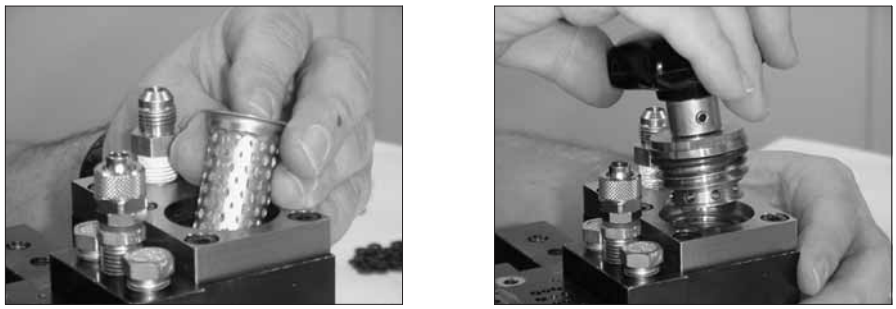


Figure 7-70 Installing the filter basket and knob

Install the Adhesive Diverter Plates and Pumps

1. See Figure 7-71. Prior to installing the adhesive diverter plates, refer to the applicator-specific reference drawing provided with this manual for the correct plate location. Install O-rings in each adhesive diverter plate used.

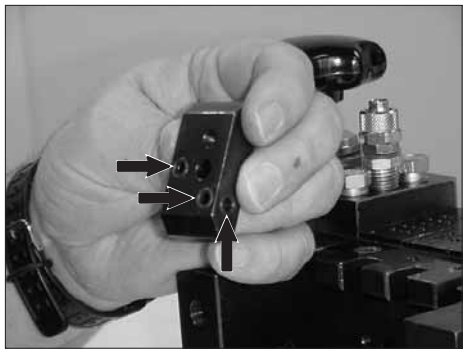


Figure 7-71 Location of the adhesive diverter plate O-rings

Install the Adhesive Diverter Plates and Pumps *(contd)*

2. See Figure 7-72. Using an M5 hex wrench, install each adhesive diverter plate and tighten the screws.

Figure 7-72 Installing an adhesive diverter plate

3. See Figure 7-73. Install the pump O-rings and seal in each pump that will be used.

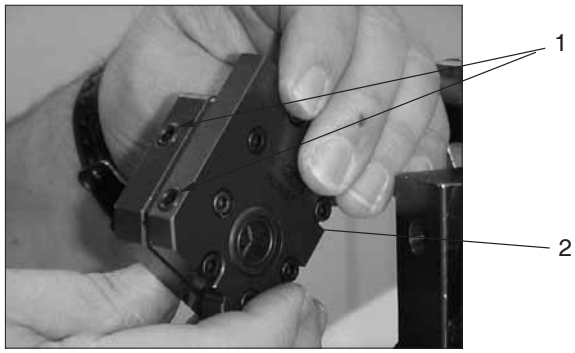


Figure 7-73 Location of the pump O-rings and seal

1. Pump O-rings
2. Pump seal

4. See Figure 7-74. Starting from the right (as you are facing the pump side of the applicator), install the pumps. This may require the careful use of a rubber mallet or dead-blow hammer.

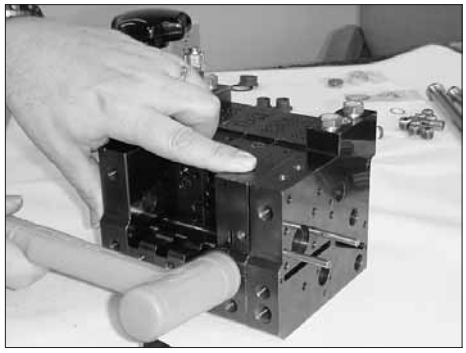


Figure 7-74 Installing pumps

5. See Figure 7-75. Once all the pumps are installed and fully seated, install the pump clamps but do not tighten the bolts.

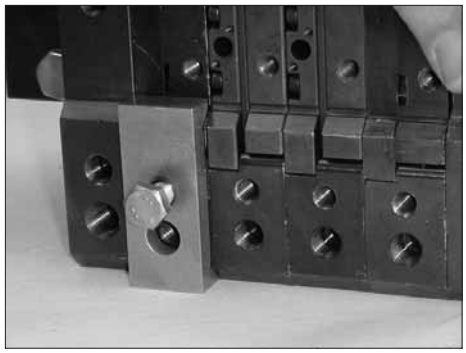


Figure 7-75 Installing a pump clamp

6. See Figure 7-76. Install the pump shaft by slightly rotating it in both directions while also pushing to align the pumps. The shaft is completely installed when the shaft end is flush with the end slice.

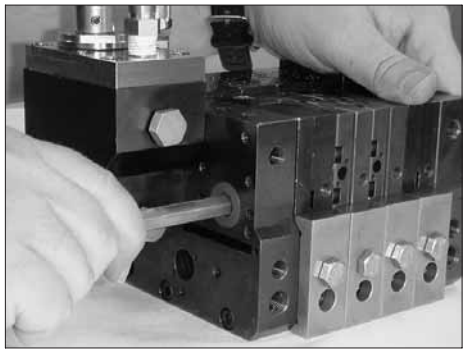


Figure 7-76 Installing the pump shaft

7. See Figure 7-77. Install the pump shaft support bearing in each end of the applicator.

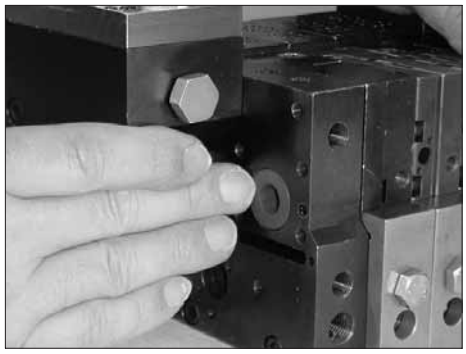


Figure 7-77 Installing the pump shaft support bearing

Install the Adhesive Diverter Plates and Pumps *(contd)*

8. See Figure 7-78. Using an M13 wrench, completely tighten the pump clamp bolts.

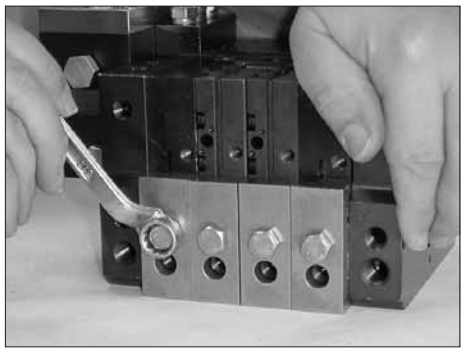


Figure 7-78 Tightening the pump clamp bolts

9. See Figure 7-79. Install pump shaft end cap O-ring.

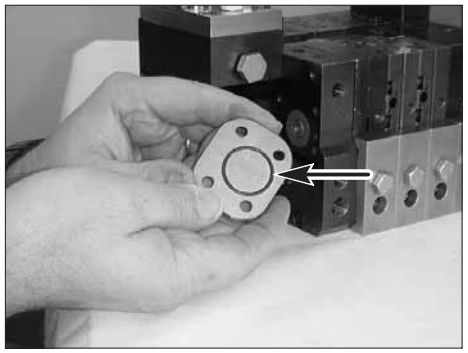


Figure 7-79 Location of the pump shaft end cap O-ring

10. See Figure 7-80. Using an M5 hex wrench, attach the pump shaft end cap and tighten the screws.

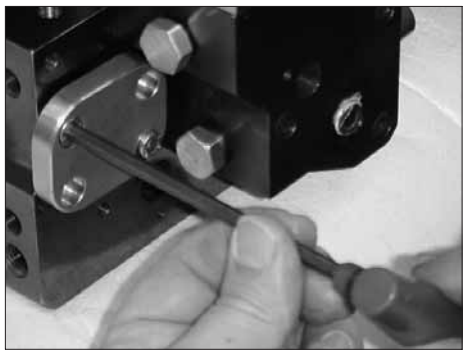


Figure 7-80 Installing the pump shaft end cap

11. See Figure 7-81. Install the pump packing O-ring and spring seal in the pump packing plate.

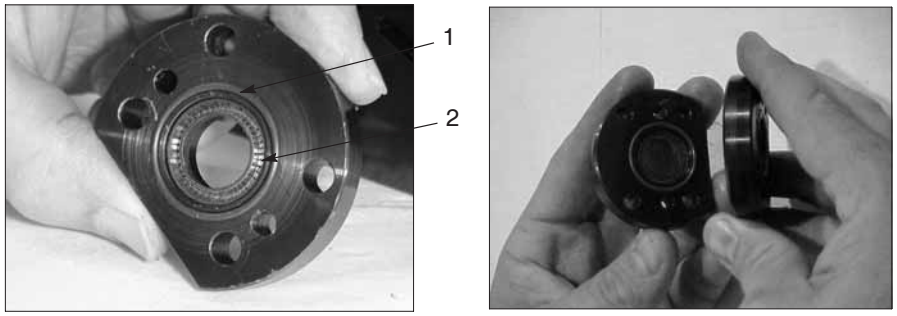


Figure 7-81 Installing the pump packing O-ring and spring seal

1. O-ring
2. Spring seal

12. See Figure 7-82. Using a hammer, carefully install the end-slice dowel pins.

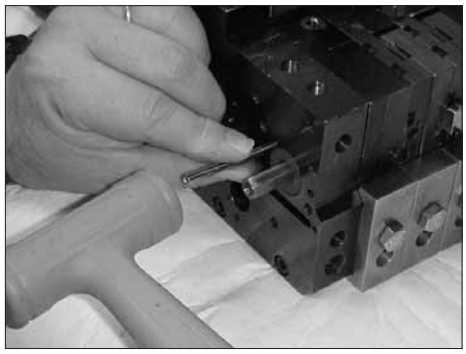


Figure 7-82 Installing the end-slice dowel pins

13. See Figure 7-83. Using an M2 hex wrench and being careful not to damage the O-rings, install the pump pressure transducer plugs.

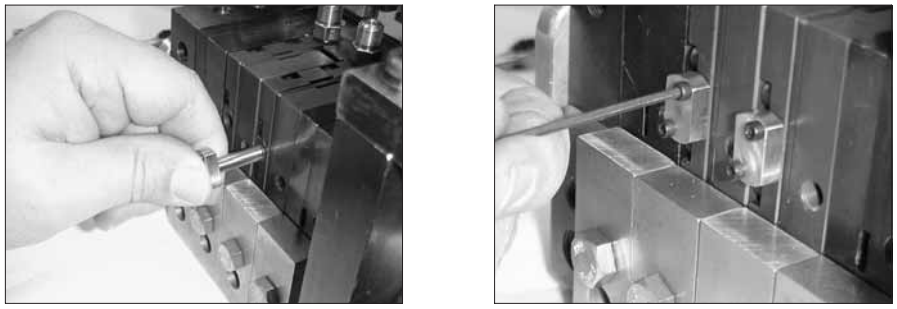


Figure 7-83 Installing the pump pressure transducer plugs

Install the Block-Off Plates and Solenoid Valves

1. See Figure 7-84. Refer to the applicator-specific reference drawing provided with this manual to determine the correct block-off plate configuration.

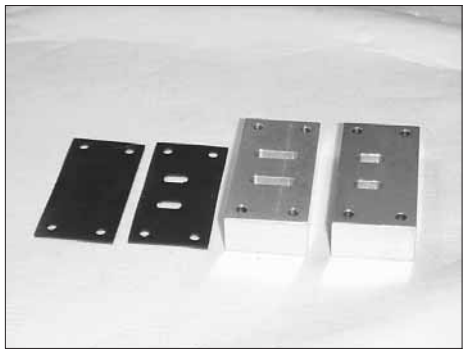


Figure 7-84 Block-off plate components

2. See Figure 7-85. Using a 2.5-mm hex wrench, attach the block-off plates to the slices not receiving solenoid valves.

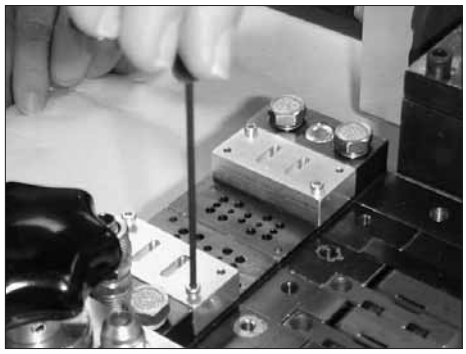


Figure 7-85 Installing block-off plates

3. See Figure 7-86. Carefully align the heat isolation gaskets and solenoid valves on the applicator and use a 2.5-mm hex wrench to secure them.

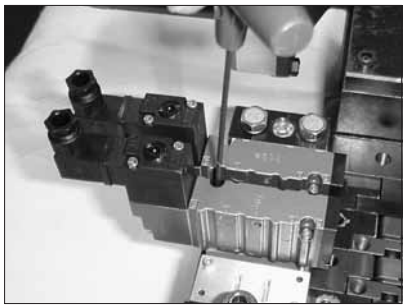


Figure 7-86 Installing solenoid valves

Install the Remaining Components

1. See Figure 7-87. Using an M4 hex wrench, install the drive adapter (three shoulder bolts).

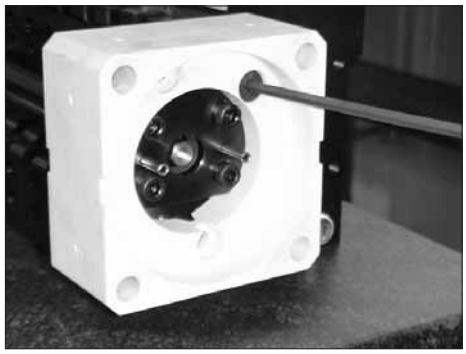


Figure 7-87 Installing the drive adapter

2. See Figure 7-88. Using an M5 hex wrench, install the reducer/motor assembly.

Figure 7-88 Installing the reducer/motor assembly

3. See Figure 7-89. Using a $^{7}/_{16}$-in. wrench, install a rupture disk in each pump and tighten.

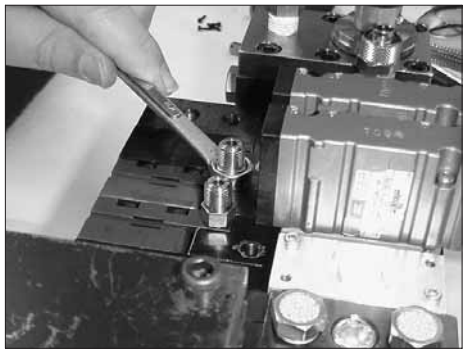


Figure 7-89 Installing a rupture disk

Install the Remaining Components *(contd)*

4. See Figure 7-90. After first inserting them by hand, use a large screwdriver to install the temperature sensor thermowell(s). Install the air temperature sensor thermowell in the center-most slice to ensure an even heat profile.

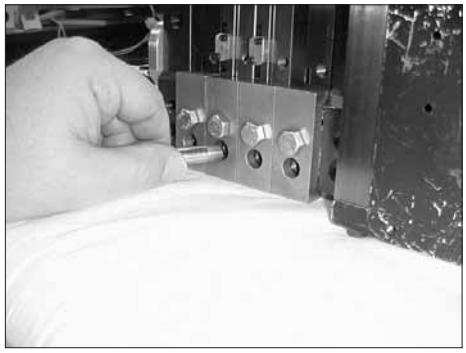


Figure 7-90 Installing a temperature sensor thermowell

5. See Figure 7-91. Carefully insert the heaters until they are completely seated and use an M3 hex wrench to tighten secure the heater screws.

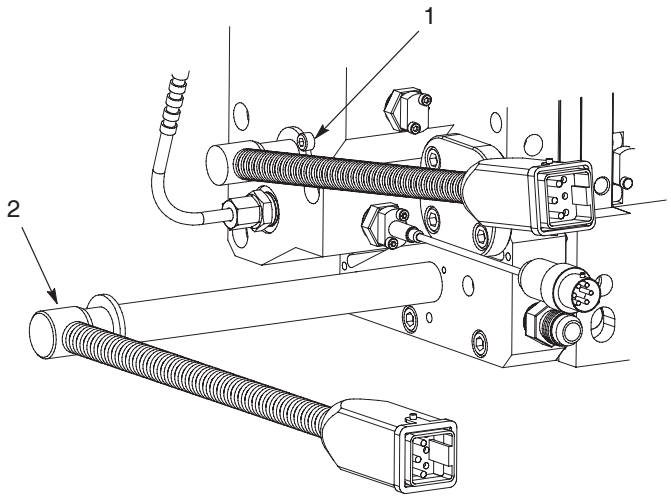


Figure 7-91 Removing a heater

1. Heater securing screw
2. Heater being removed

Applicator Hand Changeover

Use these procedures to move the motor from one side of the applicator to the other. You will need the following items:

- replacement pump shaft end cap O-ring
- replacement pump packing O-ring and spring seal
- applicator-specific reference drawing
- standard and metric wrench set
- rubber mallet or dead-blow hammer

NOTE: The front of the applicator is the side on which the modules are mounted. The left and right sides of the applicator are the left and right sides as you are facing the module side of the applicator.

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

Remove the Filter Block

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control	●	
Relieve pressure	●	
Disable the solenoid valve power supply		●
Shut off the module-actuating air supply		●
Shut off the pattern air supply		●
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

Remove the Filter Block *(contd)*

2. See Figure 7-92. Using an M3 hex wrench, remove the screws that secure the heater and then carefully remove the heaters.

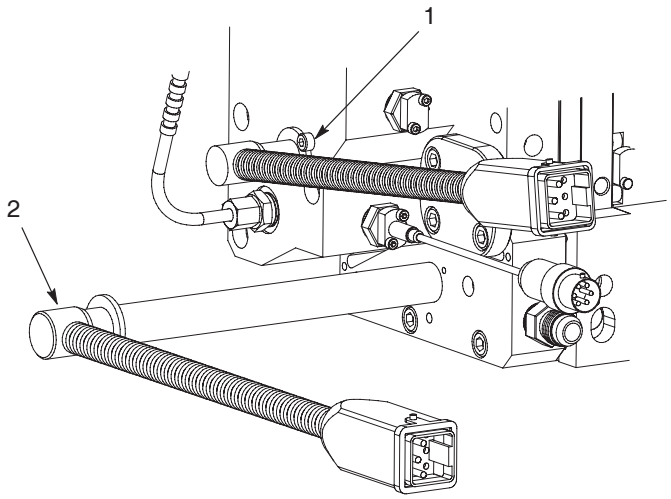


Figure 7-92 Removing a heater

1. Heater securing screw
2. Heater being removed

3. See Figure 7-93. Using an M5 hex wrench, remove the pump shaft end cap.

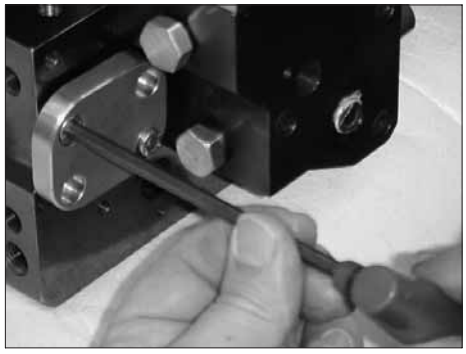


Figure 7-93 Removing the pump shaft end cap

4. See Figure 7-94. Using an M5 hex wrench, remove the filter block.

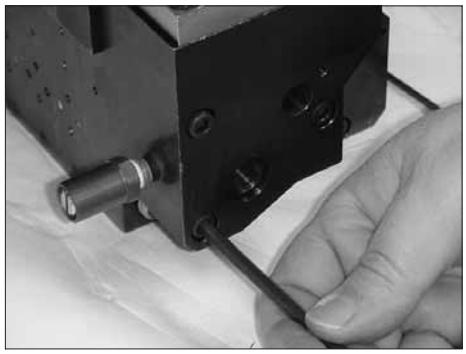


Figure 7-94 Removing the filter block

Remove the Drive

1. See Figure 7-95. Using an M5 hex wrench, remove the reducer/motor assembly from the applicator.

Figure 7-95 Removing the reducer/motor assembly

2. See Figure 7-96. Using an M4 hex wrench, remove the drive adapter (three shoulder bolts).

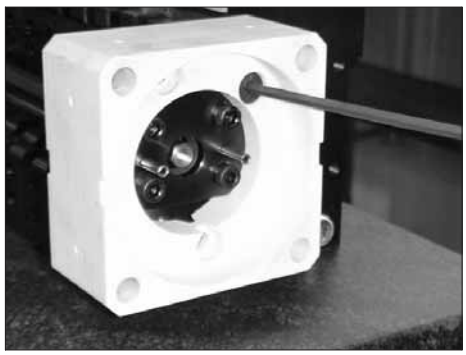


Figure 7-96 Removing the drive adapter

Install the Filter Block on the Opposite Side

1. See Figure 7-97. Move the filter block plug to what will now be the inside surface of the filter block. The filter block has identical threaded holes on each side.

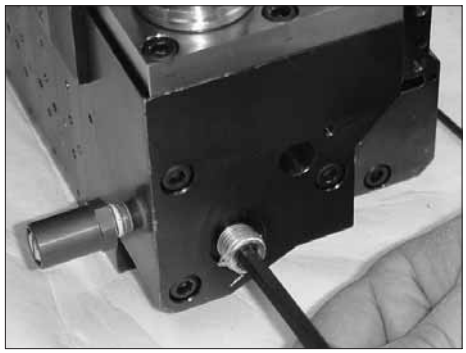


Figure 7-97 Moving the filter block plug

2. Replace all applicable O-rings between the mating surfaces of the filter block and the applicator.
3. See Figure 7-98. Using the heater as an alignment tool, carefully position the filter block on the applicator.

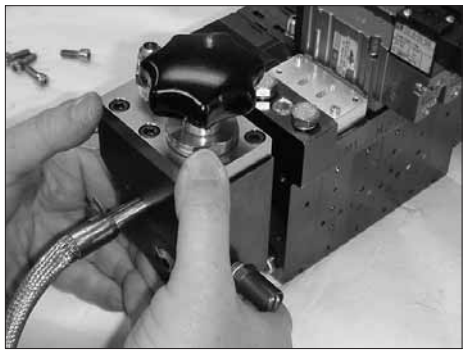


Figure 7-98 Using the heater to position the filter block

4. See Figure 7-99. Using an M5 hex wrench, secure the filter block to the applicator. Tighten the screws to 12.4 N•m (110 in.-lb).

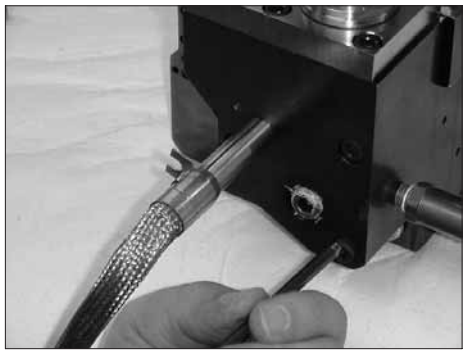


Figure 7-99 Securing the filter block

5. See Figure 7-100. Replace the pump shaft end cap O-ring; then use a 5-mm hex wrench to install the pump shaft end cap. Tighten the bolts to 10–12 N•m (89–106 in.-lb).

   NOTE: If the applicator is brass, tighten to 10.7 N•m (95 in.-lb).

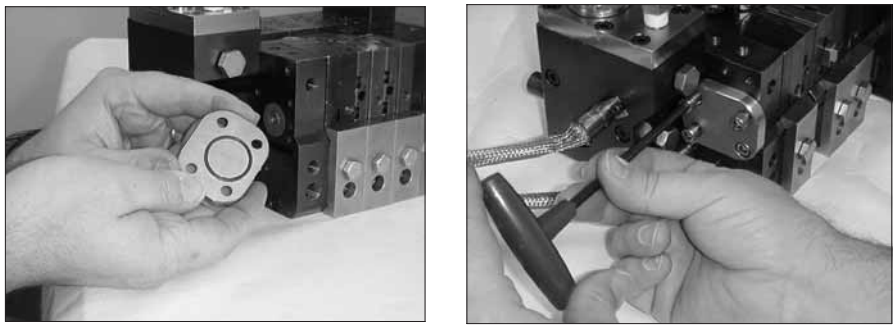


Figure 7-100 Installing the pump shaft end cap

6. Carefully insert both heaters completely and use a 3-mm hex wrench to secure them with the 4-mm socket screws removed previously.

See Figure 7-101. The opposite side of the applicator,with only the pump shaft exposed, is now ready for installation of the drive-end block assembly.

Figure 7-101 Applicator ready for drive assembly installation on the opposite side

Install the Drive Assembly on the Opposite Side

1. See Figure 7-102. Insert the end-slice dowel pins in the applicator. This will require light tapping with a hammer.

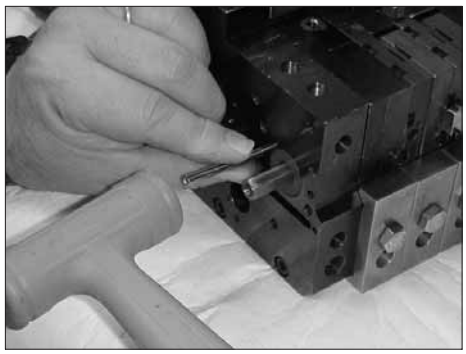


Figure 7-102 Inserting the end-slice dowel pins

2. See Figure 7-103. Replace the pump packing O-ring and spring seal; then use an M5 hex wrench to install the assembly on the applicator. Tighten the screws until they are snug.

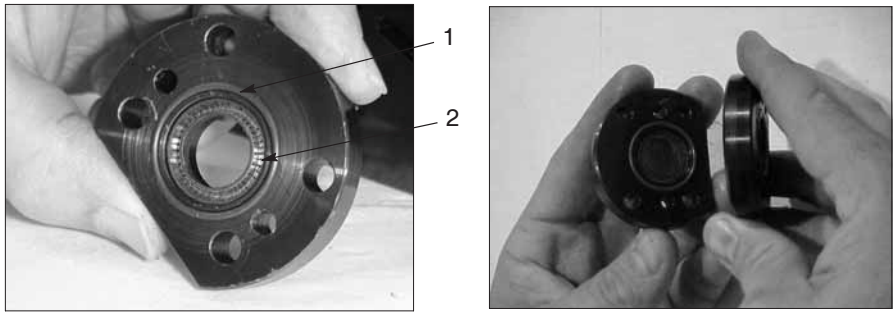


Figure 7-103 Replacing the pump packing O-ring and spring seal

1. O-ring
2. Spring seal

3. See Figure 7-104. Using an M4 hex wrench, install the drive adapter (three shoulder bolts).

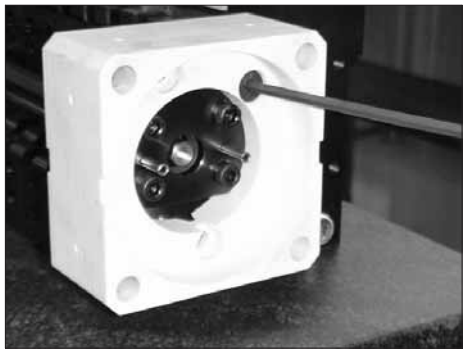


Figure 7-104 Installing the drive adapter

4. See Figure 7-105. Using an M5 hex wrench, install the reducer/motor assembly on the end-plate (four M6 bolts).

Figure 7-105 Installing the reducer/motor assembly

5. Continue to the next procedure, *Motor Rotational Check*, to check the rotational direction of the motor. If the rotational direction is not correct, the applicator will be damaged.

Motor Rotational Check

For proper operation, the applicator motor must be rotating in the correct direction. Operation of the applicator when the rotational direction is incorrect will severly damage the applicator.

The rotational direction of the motor should be checked:

- before operating the system for the first time
- after any changes have been made to the system (such as changing the hand of the applicator, replacing the applicator gear box, or replacing a motor drive inside the controller)

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control		●
Relieve pressure		●
Disable the solenoid valve power supply		●
Shut off the module-actuating air supply		●
Shut off the pattern air supply		●
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

2. See Figure 7-106. Remove the pump shaft end cap.

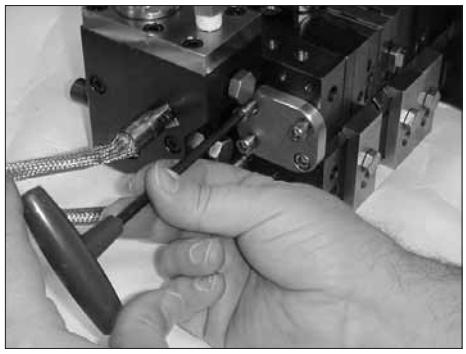


Figure 7-106 Removing the pump shaft end cap

3. Place the applicator pump in the manual mode and set the pump rpm to 2 (very slow).
4. Enable the motor control and start the applicator motor.

5. See Figure 7-107. Verify that the pump shaft is rotating away from the top of the modules.

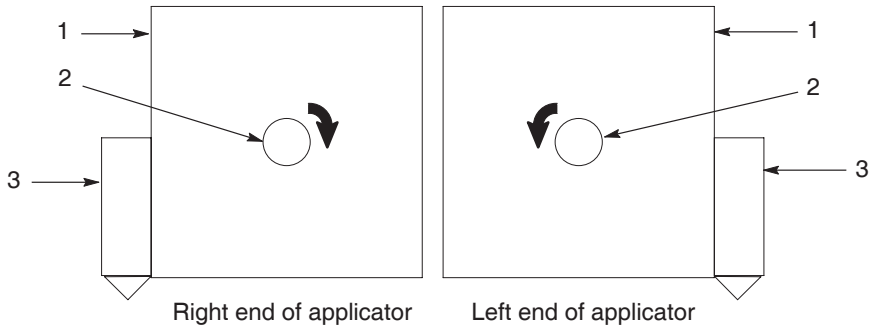


Figure 7-107 Correct rotational direction of motor

1. Side view of applicator
2. Pump shaft
3. Module

6. If the motor is not rotating in the correct direction:
   a. Stop the motor.
   b. Reverse the analog wires connected to the motor drive input/output interface cards inside the motor controller. Refer to the motor controller manual or schematics for the wire numbers.
   c. Repeat steps 5–6 to ensure that the motor is rotating in the correct direction.
7. When you have verified that the motor is rotating in the correct direction, restore the system to normal operation.

Field Installation of Optional Equipment

Use these procedures to field-install the following optional equipment:

- standard ($^1/_2$-20) pressure transducer
- miniature pressure transducer

NOTE: To replace existing equipment, refer to the appropriate replacement procedure earlier in this section.

Field-Install a Standard Pressure Transducer

Use these procedures to field-install a standard ($^1/_2$-20) pressure transducer where none previously existed. Standard pressure transducers may be installed only on the filter block. You will need the following items:

- standard pressure transducer installation kit
- standard and metric wrench set

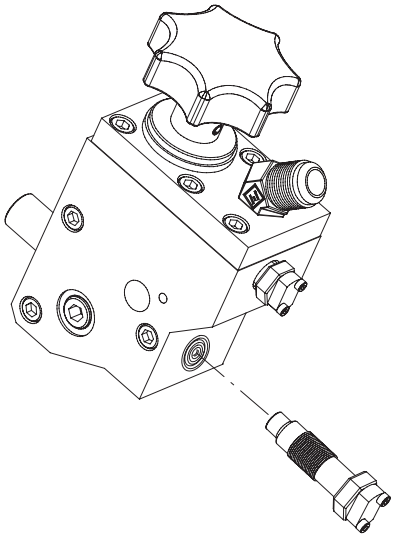
NOTE: To replace an existing pressure transducer, refer to *Standard Pressure Transducer Replacement* earlier in this section.

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control		●
Relieve pressure	●	
Disable the solenoid valve power supply		●
Shut off the module-actuating air supply		●
Shut off the pattern air supply		●
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

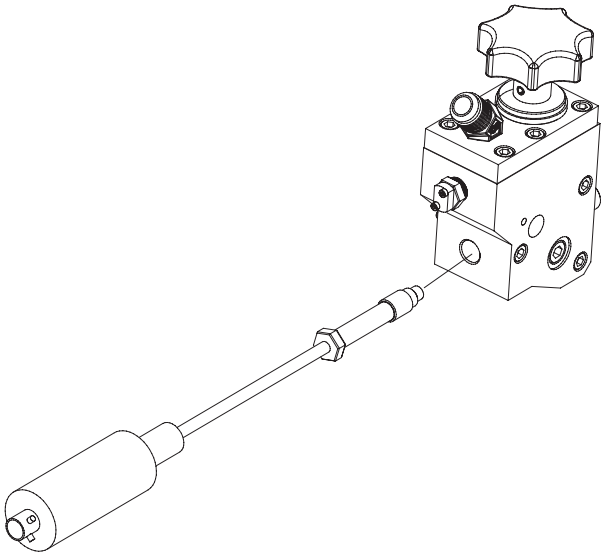
2. See Figure 7-108. Using a $^{5}/_{8}$-in. hex wench, remove the pressure transducer plug where the transducer is to be installed.



421600025

Figure 7-108 Removing a pressure transducer plug

3. See Figure 7-109. Using a $^{5}/_{8}$-in. hex wrench, install the standard pressure transducer in the transducer port.



421600023

Figure 7-109 Installing a standard pressure transducer

4. Connect the pressure transducer cordset to the appropriate monitoring equipment.

Field-Install a Miniature Pressure Transducer

Use these procedures to field-install a miniature pressure transducer where none previously existed. Miniature pressure transducers are installed in pumps and may also be installed in the filter block. You will need the following items:

- miniature pressure transducer installation kit
- standard and metric wrench set

NOTE: To replace an existing miniature pressure transducer, refer to *Miniature Pressure Transducer Replacement* earlier in this section.

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts.

1. Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control		●
Relieve pressure	●	
Disable the solenoid valve power supply		●
Shut off the module-actuating air supply		●
Shut off the pattern air supply		●
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

2. See Figure 7-110. Using a 2.5-mm hex wench, remove the plug where the transducer is to be installed. Do not remove the adapter in which the plug is installed.

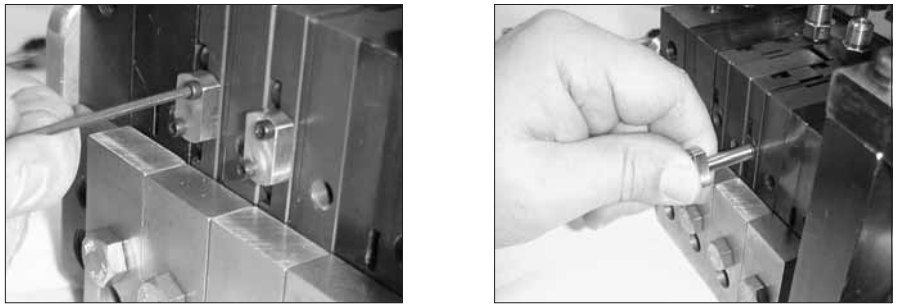


Figure 7-110 Removing a pressure transducer plug (pump location shown)

3. See Figure 7-111. Install the pressure transducer in the adapter fitting and use a 2.5-mm hex wrench to secure it with the mounting screws.

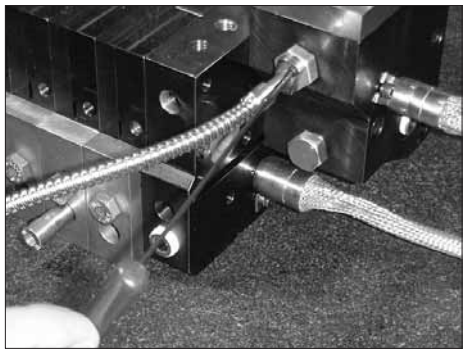


Figure 7-111 Installing a miniature pressure transducer (filter block location shown)

4. Connect the pressure transducer cordset to the appropriate monitoring equipment.

Manifold-Mounted to Flange-Mounted Solenoid Valve Conversion

A slice applicator can be configured to use either manifold-mounted or flange-mounted solenoid valves, depending on the speed requirements of your application. Most installed slice applicators have manifold-mounted solenoid valves. If your application requires the fast response times that can be provided by the flange-mounted solenoid valve version of the UM3 module, follow this procedure to make the conversion, shown in Figure 7-112.

NOTE: If your applicator has non-UM3 modules and you wish to replace them with UM3 modules that also use manifold-mounted solenoid valves, no special procedure is required—you can simply remove the old modules and install the new UM3 modules. Refer to the module replacement procedure in the UM3 module manual.

You will need the following items:

- UM3 modules with flange-mounted solenoid valves
- solenoid valve diverter plate assemblies
- standard and metric wrench set
- drain/collection pans

Refer to Section 8, *Parts*, for the part number of tools, supplies, service kits, and replacement parts. Refer to the UM3 module documentation for all UM3 module part numbers and additional information on UM3 modules. Table 7-2 provides a replacement part number cross-reference for non-UM3 and UM3 modules.

Table 7-2 Replacement UM3 Module Part Numbers for Non-UM3 Modules

Non-UM3 Module Type	Non-UM3 Module Part Number	UM3 Module Part Number for Standard-Speed Replacement	UM3 Module Part Number for High-Speed Replacement
Universal spray module, 3-way, manifold-mounted solenoid valve	1023499	1057923	1050136
Universal coating module, 3-way, manifold-mounted solenoid valve	1023197	1057926	1055208
Controlled Fiberization (CF) only module, 3-way, non-snuffback, manifold-mounted solenoid valve	321433	1057923	1050136

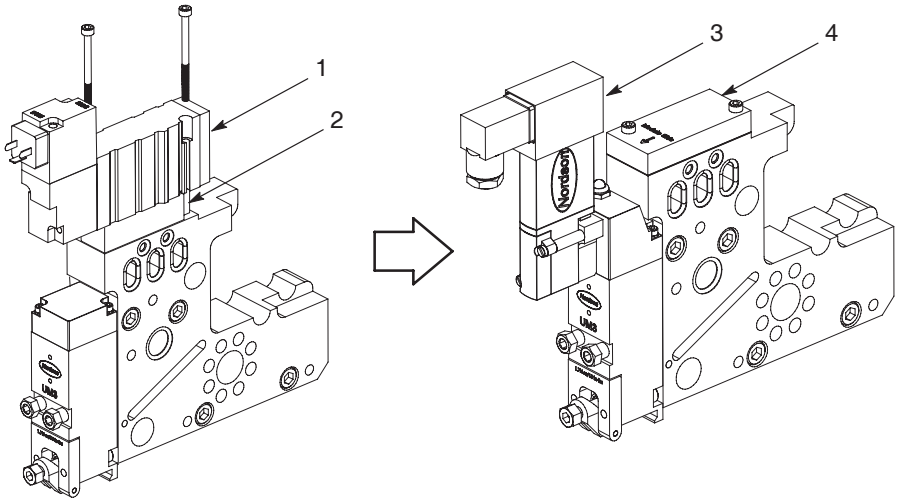


Figure 7-112 Converting from a manifold-mounted solenoid valve to a flange-mounted solenoid valve

1. Manifold-mounted solenoid valve
2. Heat isolation gasket
3. UM3 module with flange-mounted solenoid valve
4. Solenoid valve diverter plate assembly

Prepare for Conversion

Perform the activities indicated below.

Activity	Yes	No
Disable and lock out the motor control	●	
Disable and lock out the heat control		●
Relieve pressure	●	
Disable the solenoid valve power supply	●	
Shut off the module-actuating air supply	●	
Shut off the pattern air supply	●	
NOTE: Refer to *Preparation for Repairs* near the beginning of this section for detailed procedures.		

Remove the Old Modules and Solenoid Valves

1. Using a 3-mm hex wrench, remove all modules to be replaced.
2. Using a 2.5-mm hex wrench, remove all solenoid valves and heat isolation gaskets.
3. Thoroughly clean the all of the module and solenoid valve mounting surfaces. Take care not to get debris in any module or solenoid valve porting. If this does occur, take corrective action to remove the debris (using a vacuum or compressed air). Visually inspect the porting to ensure that the passageways are clear before proceeding.

Install the New UM3 Modules

1. See Figure 7-113. Using a 3-mm hex wrench, install the new UM3 modules with flange-mounted solenoid valves (1) on the applicator using the supplied 4-mm screws.
2. Using a 2.5-mm hex wrench, position the new solenoid valve diverter plates and gaskets (2) for the modules as shown in Figure 7-113 and secure these parts using the supplied 3-mm screws. Tighten the screws to 1.9–2.5 N·m (17–22 in.-lbs).

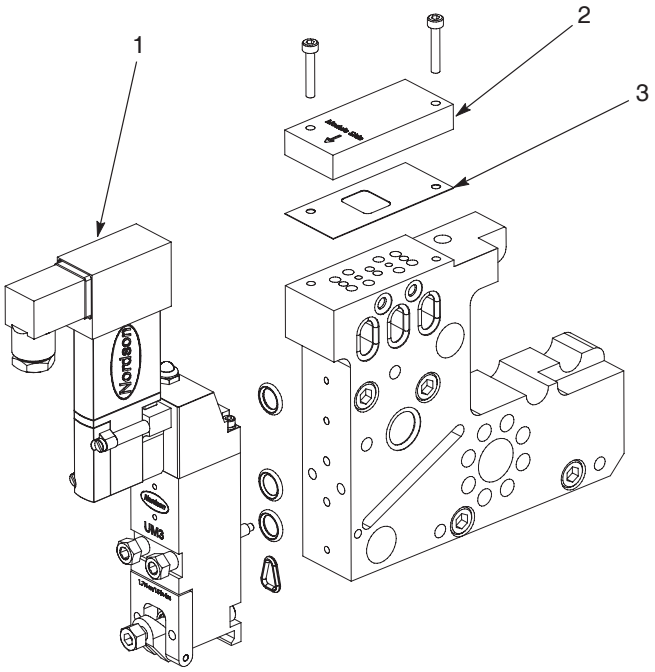


Figure 7-113 Flange-mounted solenoid valve components

1. UM3 module with flange-mounted solenoid valve
2. Solenoid valve diverter plate
3. Gasket

3. Return the air supply to the solenoid valves to the on position.

   NOTE: This should be set between 5.2 and 5.9 bar (75 and 85 psi).

4. Check for air leaks and correct them before proceeding.
5. Close the drain valve and restore the system to normal operation.

Section 8
Parts

Using the Illustrated Parts Lists

To order parts, call the Nordson Customer Service Center or your local Nordson representative. Use these five-column parts lists, and the accompanying illustrations, to describe and locate parts correctly. The following chart provides guidance for reading the parts lists.

The number in the *Item* column corresponds to the circled item number in the parts list illustration. A dash in this column indicates that the item is an assembly.

The number in the *Part* column is the Nordson part number you can use to order the part. A series of dashes indicates that the part is not saleable. In this case, you must order either the assembly in which the part is used or a service kit that includes the part.

The *Description* column describes the part and sometimes includes dimensions or specifications.

The *Note* column contains letters that refer to notes at the bottom of the parts list. These notes provide important information about the part.

The *Quantity* column tells you how many of the part is used to manufacture the assembly shown in the parts list illustration. A dash or AR in this column indicates that the amount of the item required in the assembly is not quantifiable.

Item	Part	Description	Quantity	Note
—	0000000	Assembly A	—	
1	000000	• Part of assembly A	2	A
2	- - - - - -	• • Part of item 1	1	
3	0000000	• • • Part of item 2	AR	
NS	000000	• • • • Part of item 3	2	

NOTE A: Important information about item 1

AR: As Required

NS: Not Shown

Applicator-Specific Reference Drawing

A reference drawing and bill of materials specific to your applicator are provided with this manual. Refer to this drawing and bill of materials for the part numbers of the components on your applicator. Figure 8-1 shows a page of a typical applicator-specific reference drawing.

The parts lists and illustrations in this section provide additional generic parts information for your reference as needed.

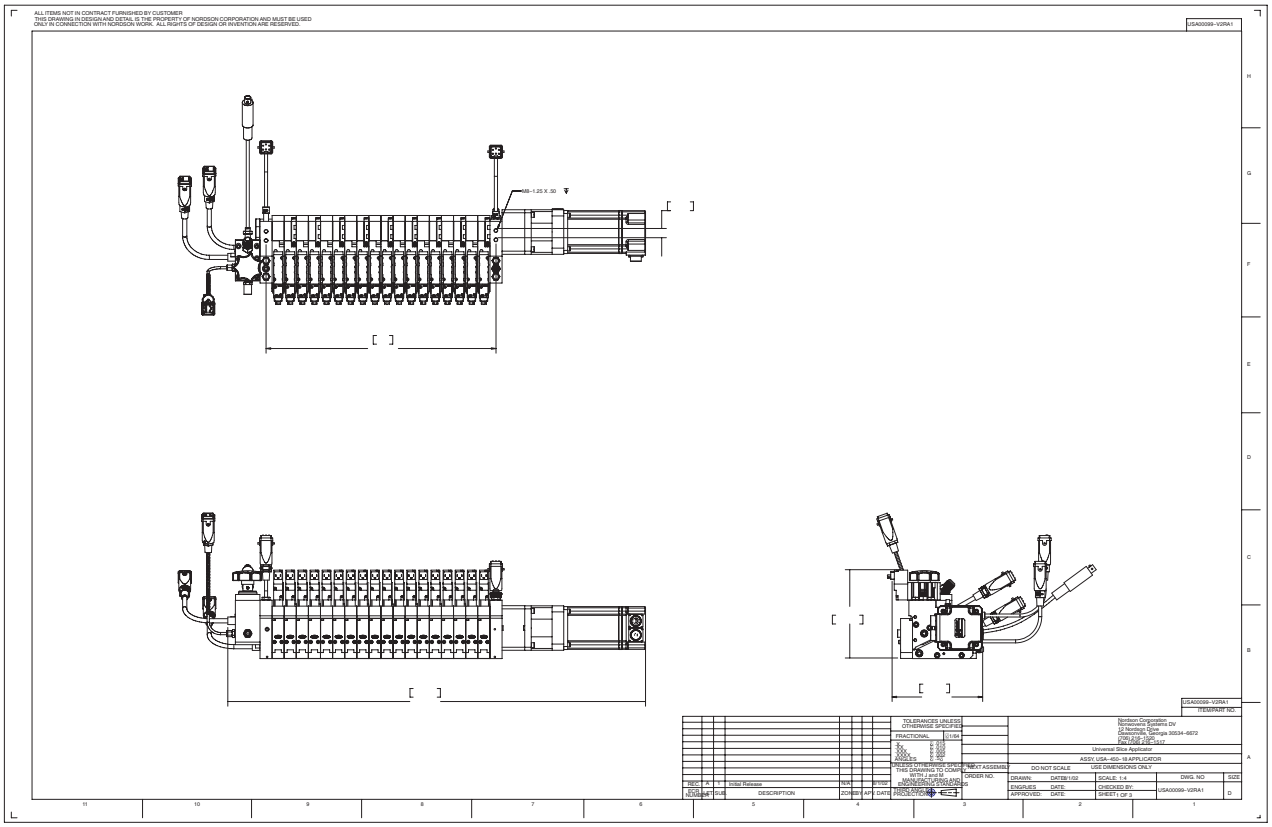


Figure 8-1 Page from a typical applicator-specific reference drawing

Recommended Spare Parts

Refer to the applicator-specific reference drawing for a recommended spare parts list specific to your applicator.

Service Kits

The following service kits contain the parts needed to perform a specific maintenance or repair activity.

Item	Part	Description	Quantity	Note
NS	1029560	Kit, rebuild, O-ring, base unit slice	—	A
NS	1029561	Kit, rebuild, O-ring, per slice	—	B
NS	1040203	Kit, differential pressure gauge	—	C

NOTE A: Order this kit to replace all the seals and O-rings on an applicator.

B: Order this kit to replace the seals and O-rings on only one manifold slice.

C: This pressure gauge may be used to facilitate the supply pressure adjustment procedure located in Section 3, *Installation*.

NS: Not Shown

Tools and Supplies

To ease maintenance and repair activities and to achieve the best maintenance/repair results, the following tools and supplies are recommended.

Item	Part	Description	Quantity	Note
NS	1017638	Kit, service tools, Universal slice applicator	—	
NS	1039961	• Tool, alignment pin, $^1/_2$ in., adhesive section	1	
NS	1017635	• Tool, alignment pin, $^5/_8$ in.	1	
NS	1017636	• Tool, O-ring, module	1	
NS	1017637	• Tool, O-ring, bypass	1	
NS	1035845	• Tool, pump puller	1	
NS	1014224	• Tool, shaft puller, $^1/_4$-28 threaded T-handle	1	
NS	900223	Lubricant, O-ring, 4 oz	1	A
NS	900344	Lubricant, anti-seize, 8 oz can	1	B
NS	902504	Tape, roll, $^1/_2$ in. x 520 in. long	1	C

NOTE A: Used to lubricate O-rings and seals.

B: Used to lubricate all straight-thread fittings.

C: Used to seal pipe threads.

NS: Not Shown

Slice Assemblies

The slice assemblies include the end slices and the manifold (middle) slices.

End Slice Parts

See Figure 8-2.

Item	Part	Description	Quantity	Note
1	- - - - - -	Plate, left manifold end	1	A
2	940133	O-ring, Viton, 0.426 ID x 0.070 W in.	3	
3	940081	O-ring, Viton, 0.188 x 0.313 x 0.063 in.	2	
4	940141	O-ring, Viton, 0.489 x 0.070 W in.	1	
5	453222	Fitting, straight, male	2	
6	1003264	Vent, breather, $^1/_4$ NPT	4	
7	- - - - - -	Plate, right manifold end	1	A
8	453220	Screw, socket, M6 x 30	4	
9	1021681	Bearing, pump shaft support	2	
10	1027745	Cap, pump shaft end	1	
11	1023645	Screw, socket, cap, M6 x 14	4	
12	1036258	Plug, $^1/_4$ NPT, recessed, hex	5	
13	940223	O-ring, Viton, 0.989 ID x 0.070 W in.	1	
14	1003265	Thermowell, $^1/_8$ NPT (small)	2	
15	1011160	Pin, dowel, 0.188 x 1.750 in.	2	
16	940181	O-ring, Viton, 0.739 ID x 0.070 W in.	1	
17	1028285	Plate, insulator	2	
NOTE A: Refer to Table 8-1 for the part number of this item.				

Table 8-1 Manifold Plate Part Numbers

Applicator Construction	Left Plate Part Number	Right Plate Part Number
Standard	1027743	1027744
Stainless-steel	1035301	1035302

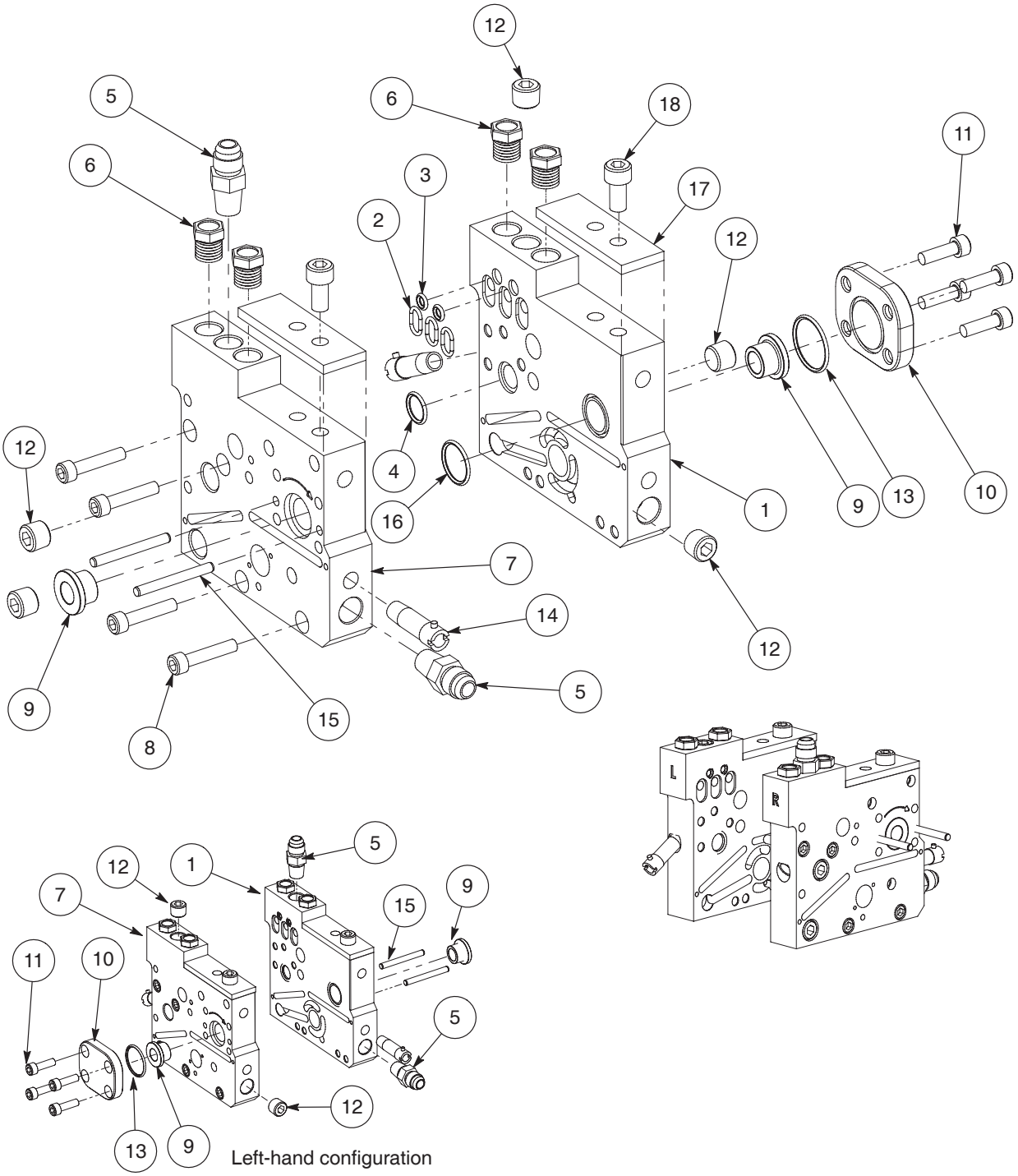


Figure 8-2 End slice assembly parts

Manifold (Middle) Slice Parts

See Figure 8-3.

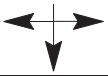
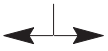
Item	Part	Description	Quantity	Note
1	1032269	Plate, middle slice 1	1	
NS	1032350	Plate, middle slice 2	1	
2	- - - - - -	Plate, diverter, adhesive	1	A, B
3	940133	O-ring, Viton, 0.426 ID x 0.070 W in.	3	
4	940141	O-ring, Viton, 0.489 x 0.070 W in.	1	
5	940081	O-ring, Viton, 0.188 x 0.313 x 0.063 in.	5	
6	982032	Screw, socket, M6 x 30	4	
7	1021684	Bolt, hex, M8 x 25, stainless-steel	1	
8	1023645	Screw, socket, cap, M6 x 14	1	
9	1027746	Clamp, mounting, pump	1	

NOTE A: Refer to Table 8-2 for the part number of this item.

B: A 50-mm pump takes up two slice positions. When ordering an adhesive diverter plate for a 50-mm pump, note which slice position the pump outlet is located on.

NS: Not Shown

Table 8-2 Adhesive Diverter Plate Part Numbers

Standard	Stainless-Steel	Flow
1003273	1034993	
1009778	1034994	
1009779	1034995	
1034996	1034997	
1034998	1034999	
1023890	1035000	
1035001	1035002	
1035003	1035004	
1035005	1035006	
1035007	1035008	
1035009	1035010	

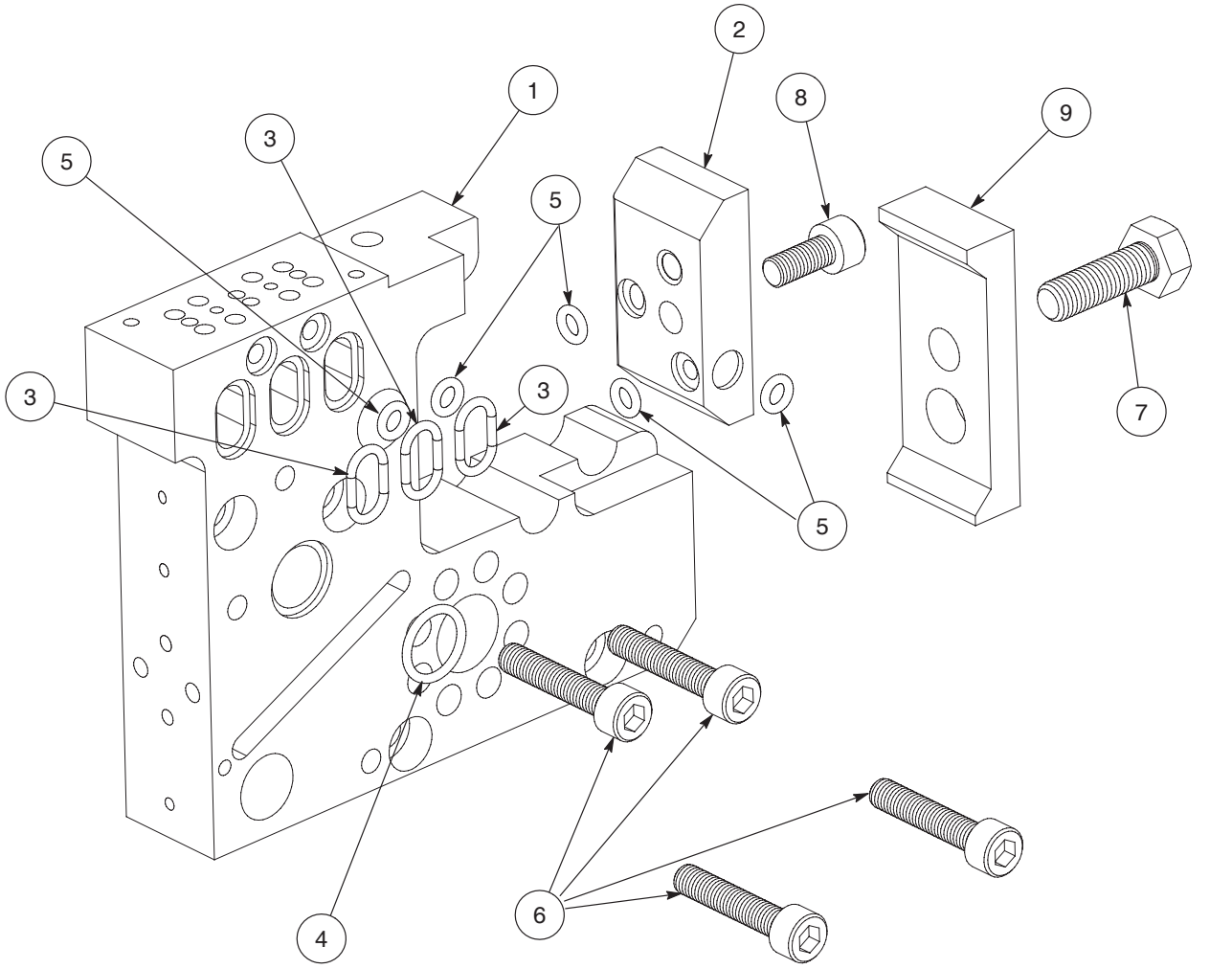


Figure 8-3 Manifold (middle) slice assembly parts

Filter Block Assemblies

The filter block assemblies include the filter block and filter screw.

Filter Block Parts

See Figure 8-4.

Item	Part	Description	Quantity	Note
—	- - - - - -	Filter block assembly	—	A
1	- - - - - -	• Block, filter	1	A
2	1047473	• Assembly, filter screw	1	B
3	- - - - - -	• Plate, capture	1	A
4	1003832	• O-ring, Viton, 2.250 D in.	1	
5	982364	• Screw, socket, M6 x 12	6	
6	1027394	• Plug, $^1/_4$ NPT, recessed, hex	1	
7	1046776	• Basket, filter	1	
8	940161	• O-ring, 0.614 ID x 0.070 W in.	1	
9	271484	• Valve, drain	1	
10	1010192	• Plug, transducer, post-filter, 1.75 in. long	1	C
11	1010191	• Plug, transducer, pre-filter, 1.34 in. long	1	C
12	1009776	• Fitting, $^1/_4$ NPT to #8 JIC, 45-degree	1	
13	1034155	• Screw, socket, cap, M6 x 50	3	

NOTE A: Refer to Table 8-3 for the part number of this item.
B: Refer to the next parts list, *Filter Screw Parts*, for a detailed parts list and illustration.
C: Refer to *Pressure Transducer Plug Parts* later in this section for a detailed parts list and illustration.

Table 8-3 Filter Block Assembly Part Numbers

Applicator Construction	Filter Size	Filter Block Assembly Part Number	Filter Block Part Number	Capture Plate Part Number
Standard	150 micron	1023898	1027747	1027748
Stainless-steel	150 micron	1035225	1035228	1034973

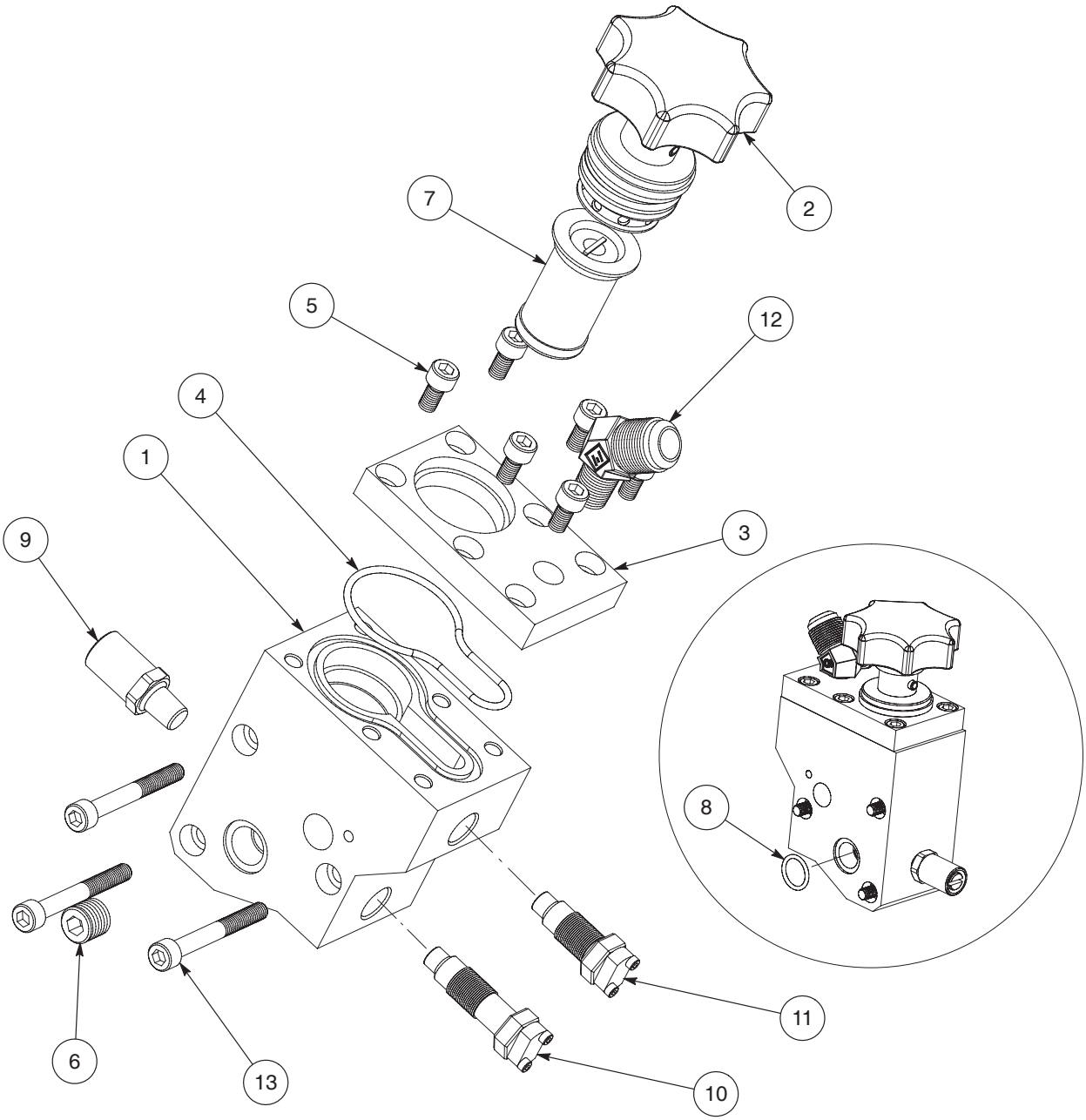


Figure 8-4 Filter block assembly parts

Filter Screw Parts

See Figure 8-5.

Item	Part	Description	Quantity	Note
—	1047473	Filter screw assembly	—	
1	1047472	• Screw, filter	1	
2	1000640	• O-ring, $1^{7}/_{16}$ x $^{1}/_{8}$ in.	1	
3	453157	• Knob	1	
4	1034156	• Pin, roll, $^{3}/_{16}$ x $^{7}/_{8}$ in.	1	

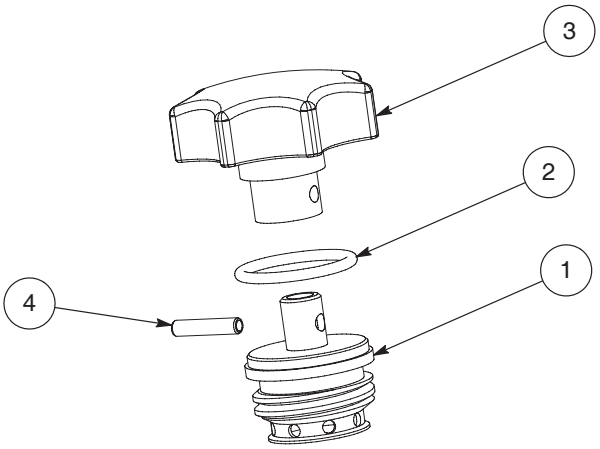


Figure 8-5 Filter screw assembly parts

This page intentionally left blank.

Pump Assemblies

The pump assemblies include the pump, the pump packing, and the pump substitution block.

Pump Parts

See Figure 8-6.

Item	Part	Description	Quantity	Note
1	- - - - - -	Pump assembly, single-stream, 25 mm	—	A
2	- - - - - -	Pump assembly, single-stream, 50 mm	—	B
3	1003271	Seal, pump face	1	
4	940081	O-ring, Viton, 0.188 x 0.313 x 0.063 in.	2 or 4	
5	1062567	Kit, pump transducer plug	1	C
5A	1028019	• Seal, crush, pump transducer plug	1	
5B	1036232	• Screw, socket, cap, M2.5 x 10	2	
6	1003262	Kit, rupture disk	1	
—	- - - - - -	• Diffuser	1	
—	- - - - - -	• Seal, crush	1	
—	- - - - - -	• Disk, rupture	1	

NOTE A: Refer to Table 8-4 for the 25-mm pump assembly and pump-only part numbers.

B: Refer to Table 8-5 for the 50-mm pump assembly and pump-only part numbers. A 50-mm pump takes up two slice positions. When ordering an adhesive diverter plate for a 50-mm pump, note which slice position the pump outlet is located on.

C: If desired, this plug can be removed and a miniature pressure transducer can be installed. Refer to *Optional Pressure Transducer Assemblies* later in this section.

Table 8-4 25-mm Pump Part Numbers

Applicator Construction	Pump Output Rate (cc/rev)	Pump Assembly Part Number	Pump Part Number
Standard	0.160	1014263	1035172
Stainless-steel	0.160	1025178	1035173
Standard	0.248	1003267	1035174
Stainless-steel	0.248	1035229	1035175
Standard	0.320	1010738	1010435
Stainless-steel	0.320	1035230	1035176
Standard	0.584	1003268	1027820
Stainless-steel	0.584	1026179	1035177

Table 8-5 50-mm Pump Part Numbers

Applicator Construction	Pump Output Rate (cc/rev)	Pump Assembly Part Number	Pump Part Number
Standard	1.752	1002642	1036293
Standard	2.92	1002644	1036295
Standard	3.50	1002645	1036296
Stainless-steel	1.752	1026014	1036294

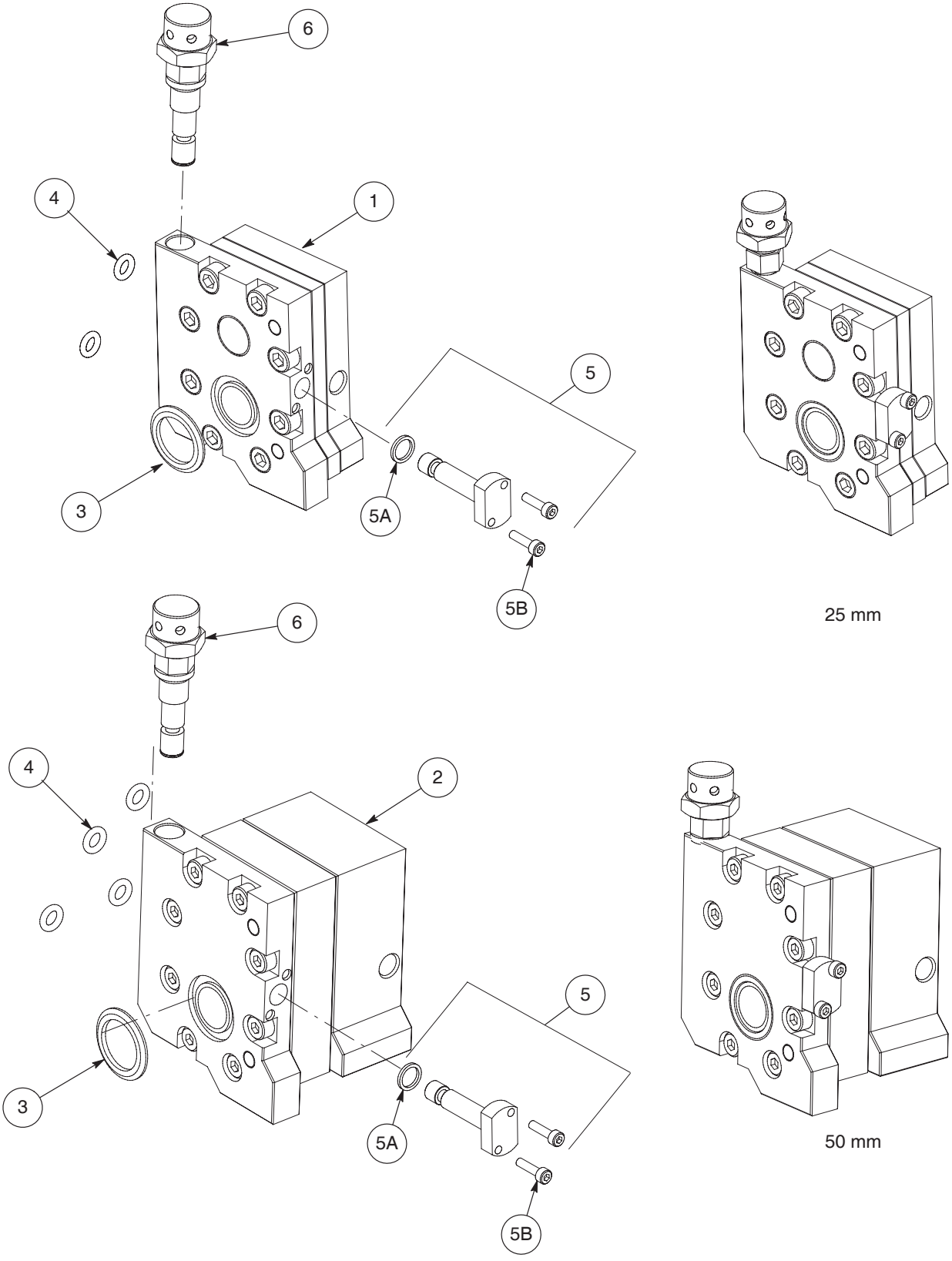


Figure 8-6 Pump assembly parts

Pump Packing Parts

See Figure 8-7.

Item	Part	Description	Quantity	Note
—	1027824	Pump packing assembly	—	
1	1034158	• Plate, pump packing	2	
2	453220	• Screw, socket, M6 x 30	4	
3	940223	• O-ring, Viton, 0.989 ID x 0.070W in.	2	
4	1003269	• Seal, shaft, $^{5}/_{8}$ ID x $^{7}/_{8}$ OD in.	2	

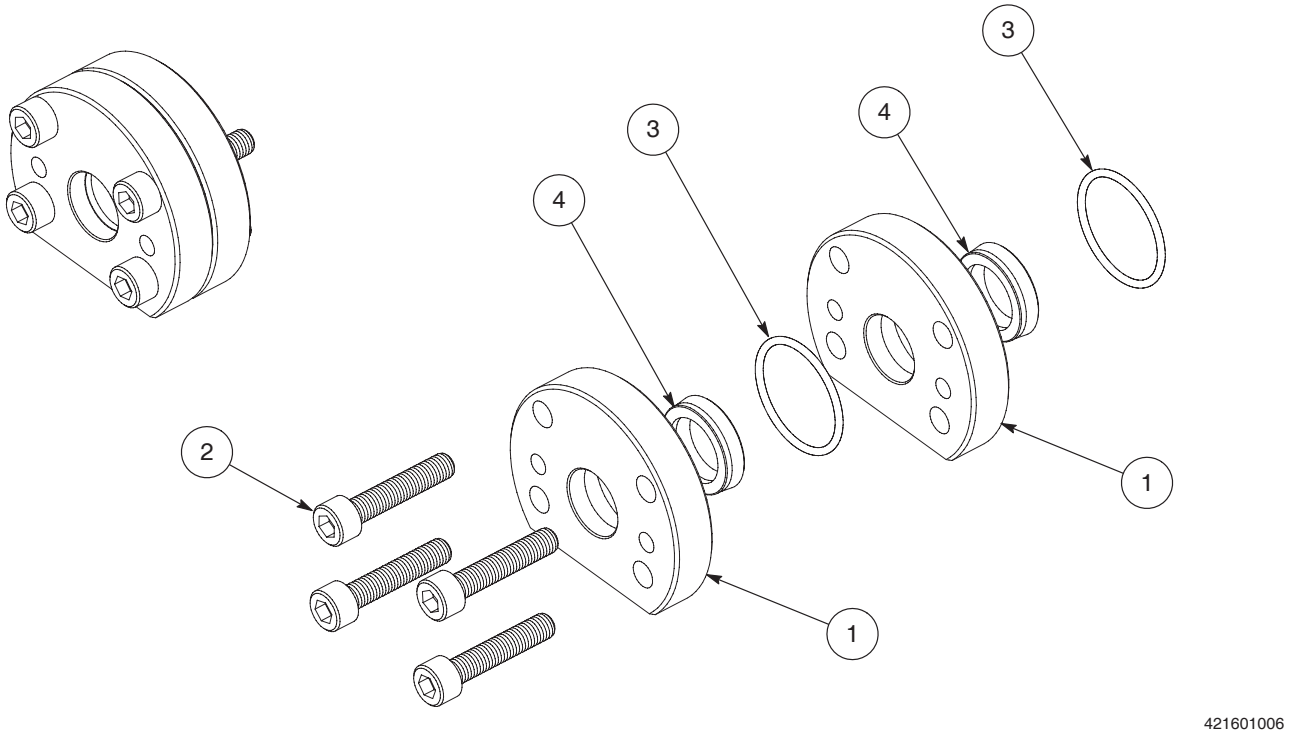


Figure 8-7 Pump packing assembly parts

Pump Substitution Block Parts

See Figure 8-8.

Item	Part	Description	Quantity	Note
—	1053732	Pump substitution block assembly, standard	—	
—	1053731	Pump substitution block assembly, stainless-steel	—	
1	- - - - - -	• Plate, pump substitution	1	
2	940081	• O-ring, Viton, 0.188 x 0.313 x 0.063 in.	2	
3	1003271	• Seal, pump face	1	

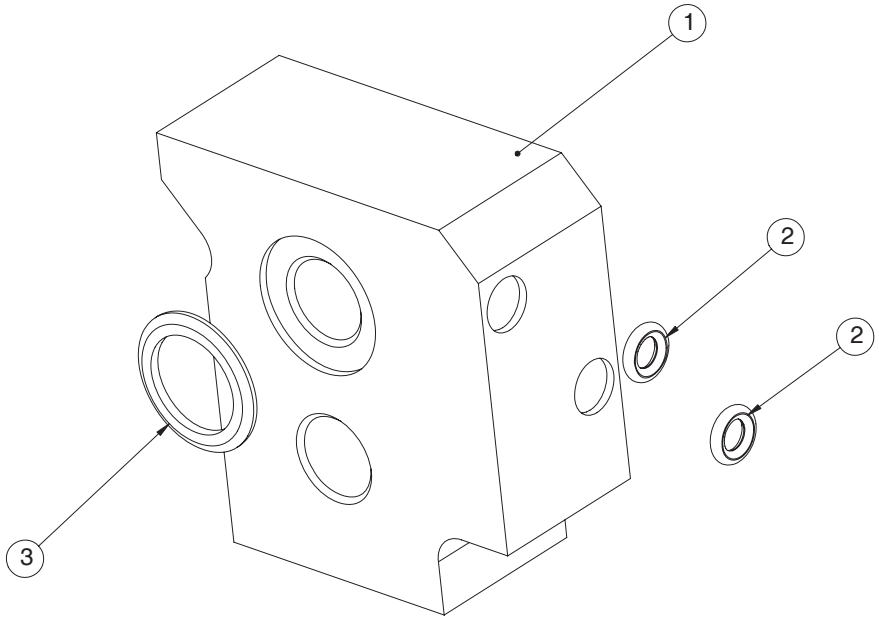


Figure 8-8 Pump substitution block assembly parts

Drive Assemblies

Two drive assembly configurations are available: inline and right-angle.

Inline Drive Assembly Parts

See Figure 8-9.

Item	Part	Description	Quantity	Note
—	1072389	Inline drive assembly	—	
1	1064958	• Motor, servo, MPL, 0.73 kw (1.0 hp)	1	
2	1034159	• Screw, socket, cap, M5 x 16	4	
3	1034180	• Screw, socket, cap, M6 x 40	4	
4	1036238	• Screw, shoulder, M8 x 35	3	
5	—	• Item no. not used	—	
6	1036261	• Plug, hole, $^3/_4$ in., plain steel	1	
7–9	—	• Item nos. not used	—	
10	1035079	• Adapter, motor attachment	1	
11	1070659	• Gearbox, 92 mm VLN, 10:1 ratio, MPL motor	1	
12	- - - - - -	Shaft, pump	1	A
NOTE A: Refer to Table 8-6 for the part number of this item.				

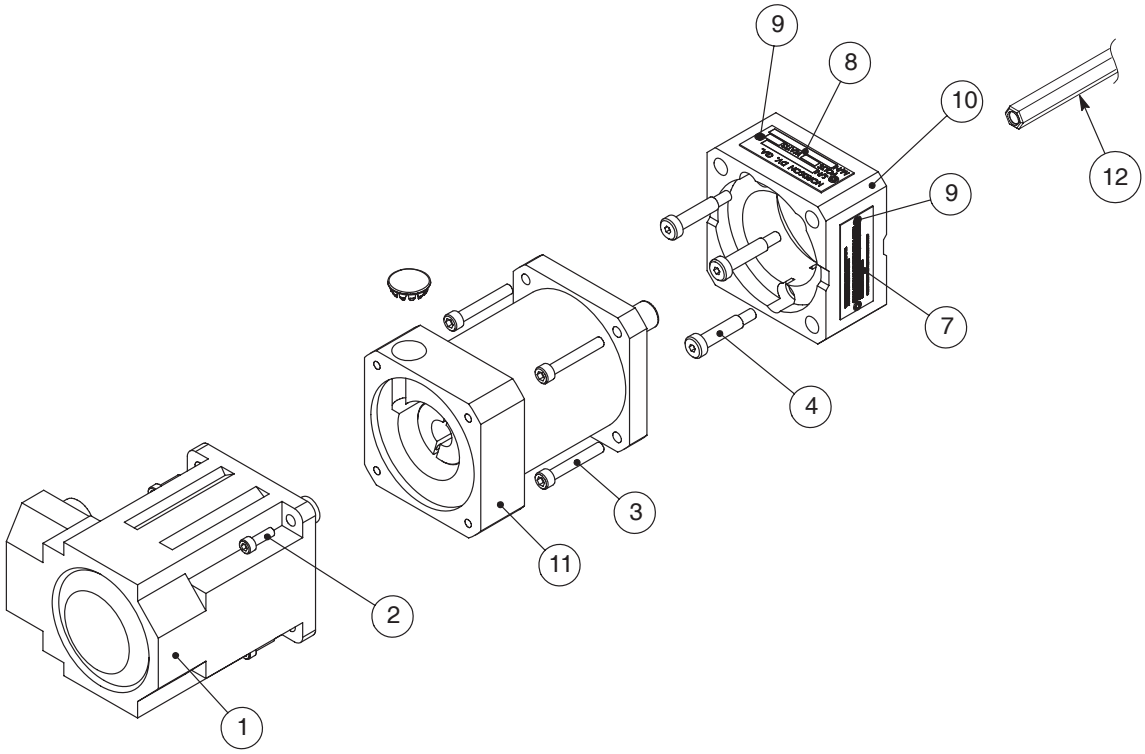


Figure 8-9 Inline drive assembly parts

Right-Angle Drive Assembly Parts

See Figure 8-10.

Item	Part	Description	Quantity	Note
—	1070662	Right-angle drive assembly	—	
1	1064958	• Motor, servo, MPL, 0.73 kw (1.0 hp)	1	
2	815927	• Screw, socket, cap, M5 x 20	4	
3	981378	• Screw, socket, M6 x 35	4	
4	1073409	• Screw, shoulder, M8 x 25	3	
5–8	—	• Item nos. not used	—	
9	1013816	• Adapter, right angle drive	1	
10	1070660	• Gearbox, Servo, 90-degree, 10:1, MPL motor	1	
11	- - - - - -	Shaft, pump	1	A
NOTE A: Refer to Table 8-6 for the part number of this item.				

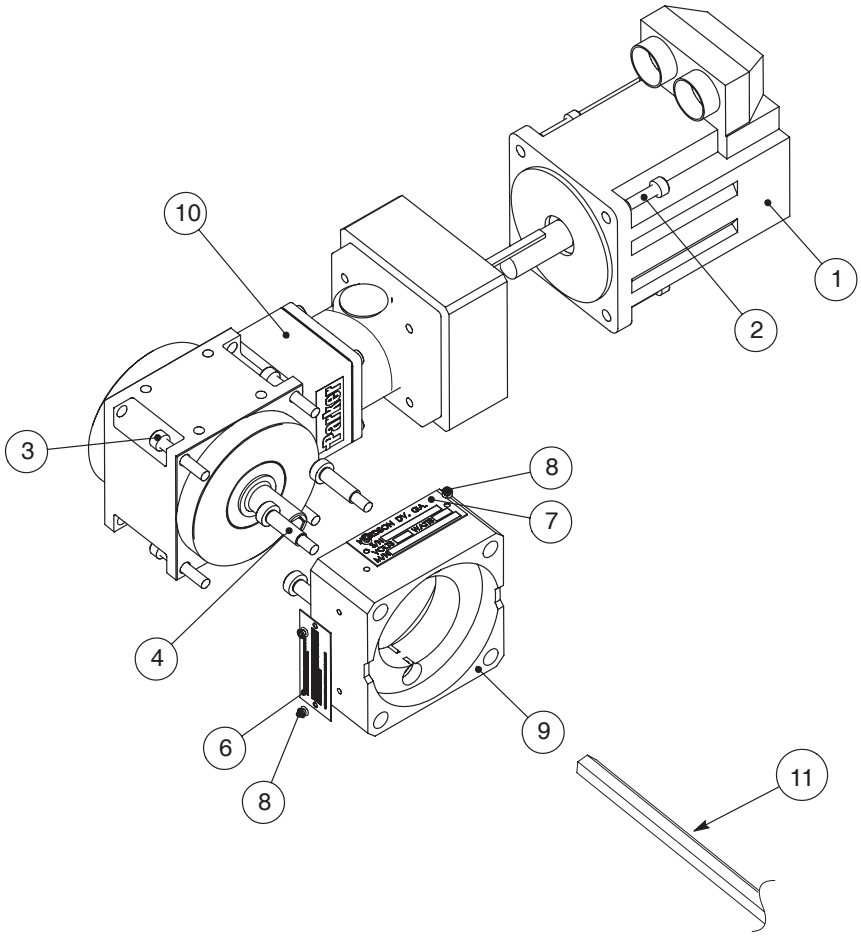


Figure 8-10 Right-angle drive assembly parts

Pump Shaft Part Numbers

Table 8-6 Pump Shaft Part Numbers

Number of Manifold Slices	Steel Part Number	Stainless-Steel Part Number
1	1022700	1035043
2	1022701	1035044
3	1022702	1035045
4	1022703	1035046
5	1022704	1035047
6	1022705	1035048
7	1022706	1035049
8	1022707	1035050
9	1022708	1035051
10	1022709	1035052
11	1022710	1035053
12	1022711	1035054
13	1022712	1035055
14	1022713	1035056
15	1022714	1035057
16	1022715	1035058
17	1022716	1035059
18	1022717	1035060
19	1022718	1035061
20	1022719	1035062

Heater and Sensor Assemblies

The heater and sensor assemblies include the adhesive and air heaters, the adhesive and air temperature sensors, and the optional pump and immersion temperature sensors.

Heaters

See Figure 8-11.

Item	Part	Description	Quantity	Note
—	- - - - - -	Heater assembly, adhesive	1	A
—	- - - - - -	Heater assembly, air	1	A
NOTE A: The heater assembly part number varies depending on the heater length. Refer to Table 8-7 for the heater part number.				

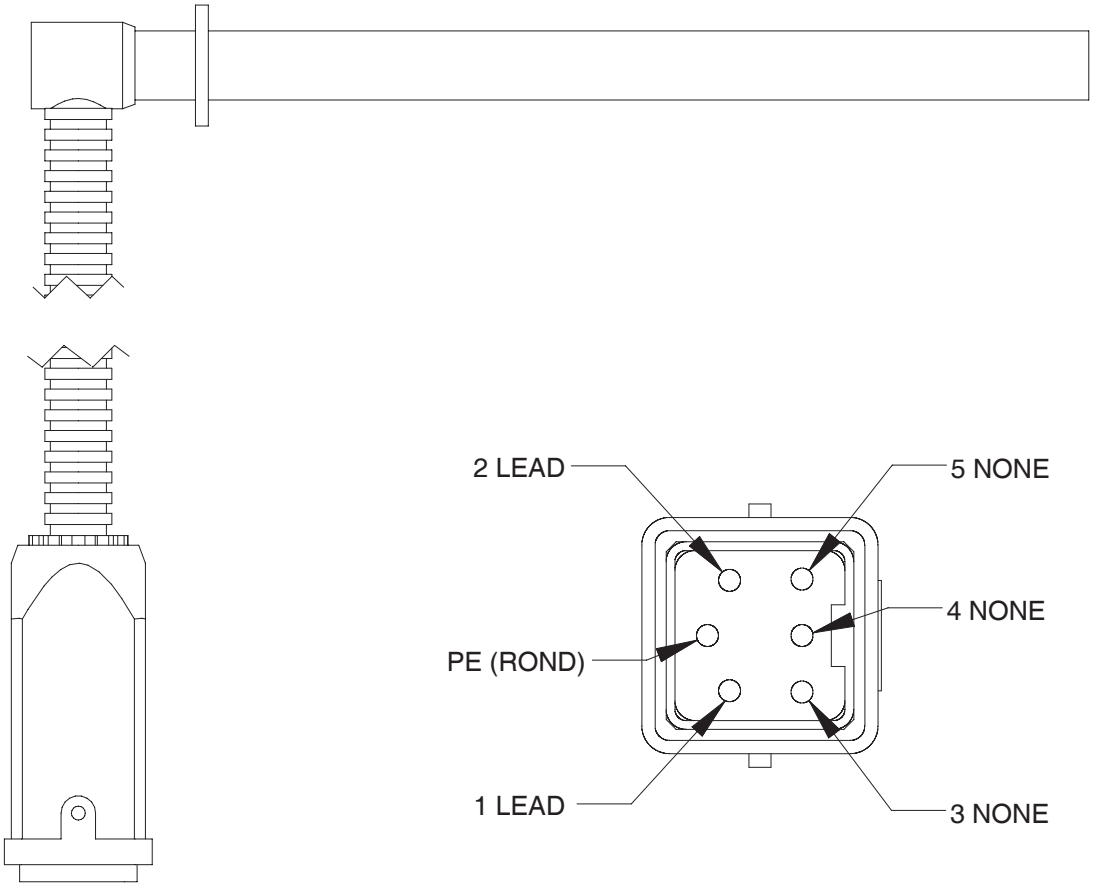


Figure 8-11 Heater assembly

Heaters *(contd)*

Table 8-7 Adhesive and Air Section Heater Part Numbers

Number of Manifold Slices	Adhesive Section Heater		Air Section Heater	
	Voltage and Wattage	Heater Part Number	Voltage and Wattage	Heater Part Number
1	240 VAC, 510 W	1032063	240 VAC, 596 W	1032090
2	240 VAC, 630 W	1032064	240 VAC, 716 W	1032091
3	240 VAC, 750 W	1032065	240 VAC, 836 W	1032093
4	240 VAC, 870 W	1032066	240 VAC, 956 W	1032094
5	240 VAC, 990 W	1032067	240 VAC, 1076 W	1032095
6	240 VAC, 1110 W	1032068	240 VAC, 1196 W	1032096
7	240 VAC, 1230 W	1032069	240 VAC, 1316 W	1032097
8	240 VAC, 1350 W	1032070	240 VAC, 1436 W	1032098
9	240 VAC, 1470 W	1032071	240 VAC, 1556 W	1032099
10	240 VAC, 1590 W	1032072	240 VAC, 1676 W	1032100
11	240 VAC, 1710 W	1032073	240 VAC, 1796 W	1032101
12	240 VAC, 1830 W	1032074	240 VAC, 1916 W	1032102
13	240 VAC, 1950 W	1032075	240 VAC, 2036 W	1032103
14	240 VAC, 2070 W	1032076	240 VAC, 2156 W	1032104
15	240 VAC, 2190 W	1032077	240 VAC, 2276 W	1032105
16	240 VAC, 2340 W	1032078	240 VAC, 2396 W	1032106
17	240 VAC, 2490 W	1032079	240 VAC, 2516 W	1032107
18	240 VAC, 2640 W	1032080	240 VAC, 2636 W	1032108
19	240 VAC, 2790 W	1032081	240 VAC, 2756 W	1032109
20	240 VAC, 2940 W	1032082	240 VAC, 2876 W	1032120

Adhesive and Air Temperature Sensors

See Figure 8-12. These fixed-depth temperature sensors are used to monitor and control the temperature of the heated adhesive and air zones in the applicator. Order the correct type of sensor for your applicator. If you are unsure which sensor to order, refer to the applicator-specific reference drawing provided with this manual for the part number.

Type	Direction	Sensor Length	Part Number
100-ohm platinum	Straight	85.8 mm (3.38 in.)	1033855
	90-degree	85.8 mm (3.38 in.)	1033858
120-ohm nickel	Straight	85.8 mm (3.38 in.)	1033856
	90-degree	85.8 mm (3.38 in.)	1033859
J-type thermocouple	Straight	85.8 mm (3.38 in.)	1039478
	90-degree	85.8 mm (3.38 in.)	1039415

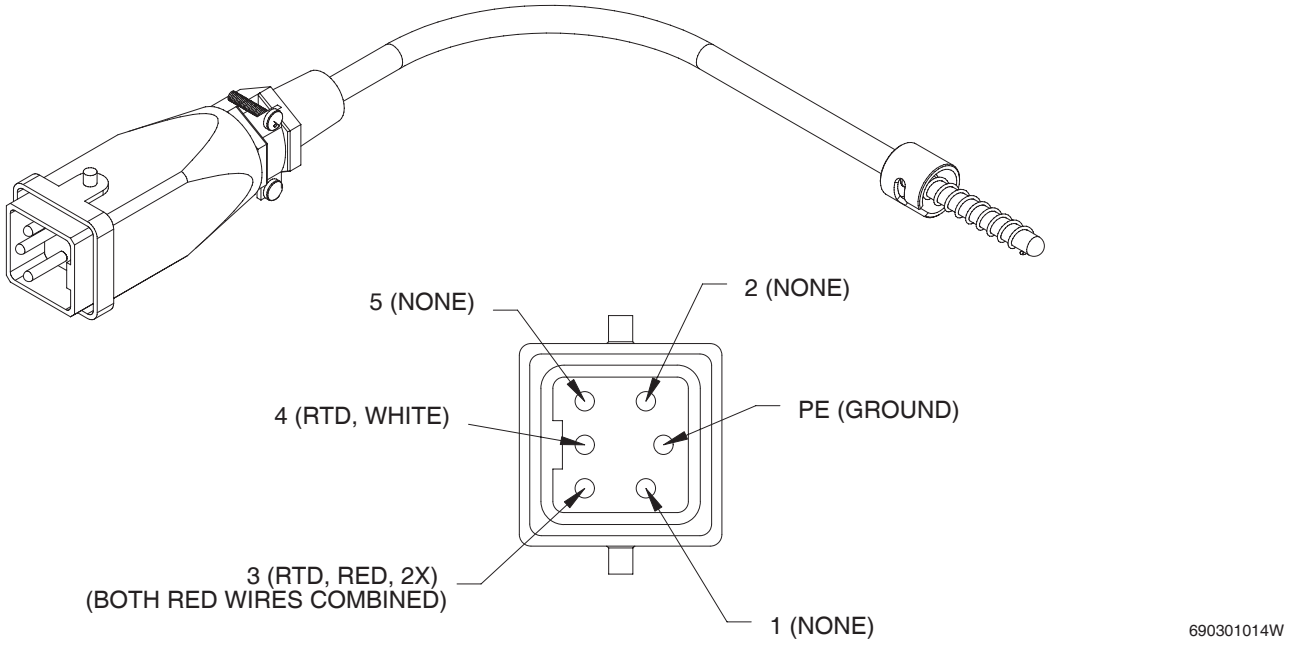


Figure 8-12 Air or adhesive temperature sensor assembly

Optional Immersion Sensors

See Figure 8-13.

Item	Part	Description	Quantity	Note
—	1010059	Sensor, immersion, 100 ohm RTD, platinum	1	A
—	1013230	Sensor, immersion, 120 ohm RTD, nickel	1	A
—	1013231	Sensor, immersion, J-type thermocouple	1	A

NOTE A: These optional sensors can be used to monitor the temperature of the adhesive flowing through the filter block. They cannot be used to control the adhesive temperature. Order the correct type of sensor for your applicator. If you are unsure which sensor to order, refer to the applicator-specific reference drawing provided with this manual for the part number.

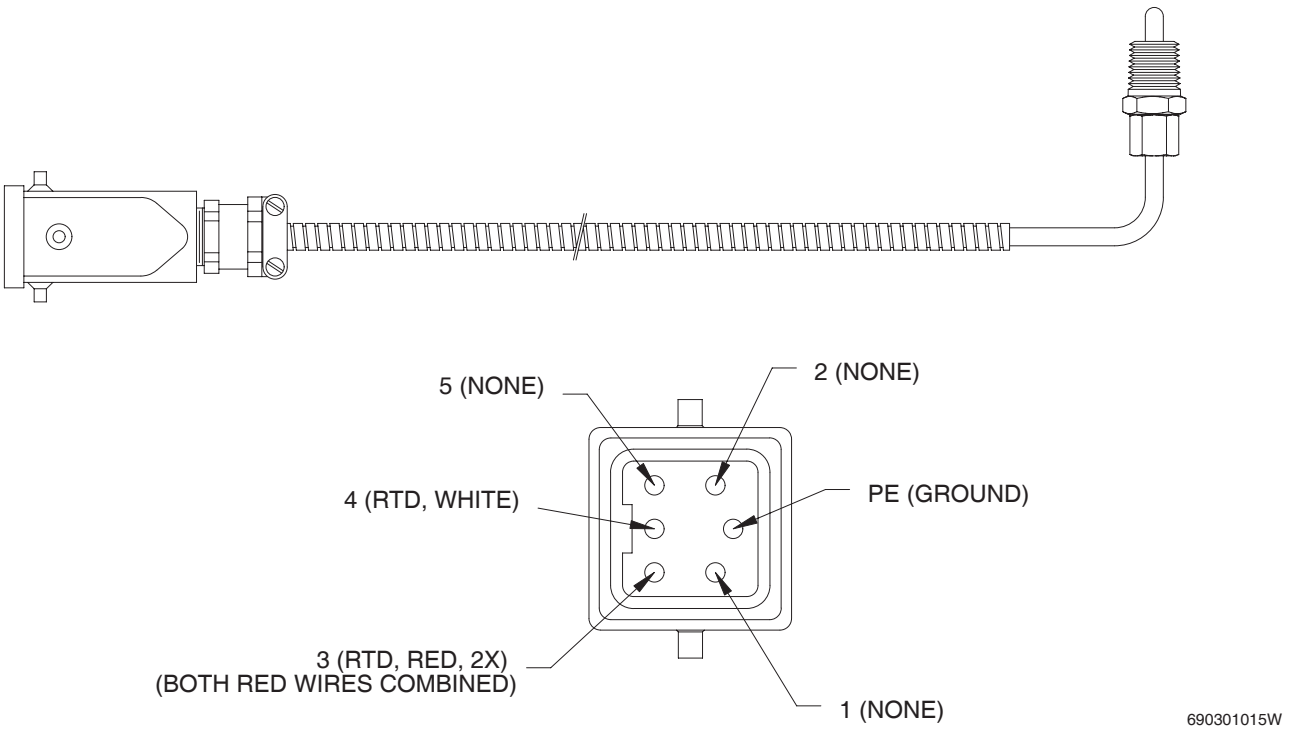


Figure 8-13 Immersion sensor assembly

Optional Pump Temperature Sensors

See Figure 8-14.

Item	Part	Description	Quantity	Note
—	1005451	Sensor, pump, 100 ohm RTD, platinum	AR	A
—	1013229	Sensor, pump, 120 ohm RTD, nickel	AR	A
—	1013228	Sensor, pump, J-type thermocouple	AR	A

NOTE A: These optional sensors can be used to monitor the temperature of a pump. They cannot be used to control pump temperature. Order the correct type of sensor for your applicator. If you are unsure which sensor to order, refer to the applicator-specific reference drawing provided with this manual for the part number.

AR: As Required

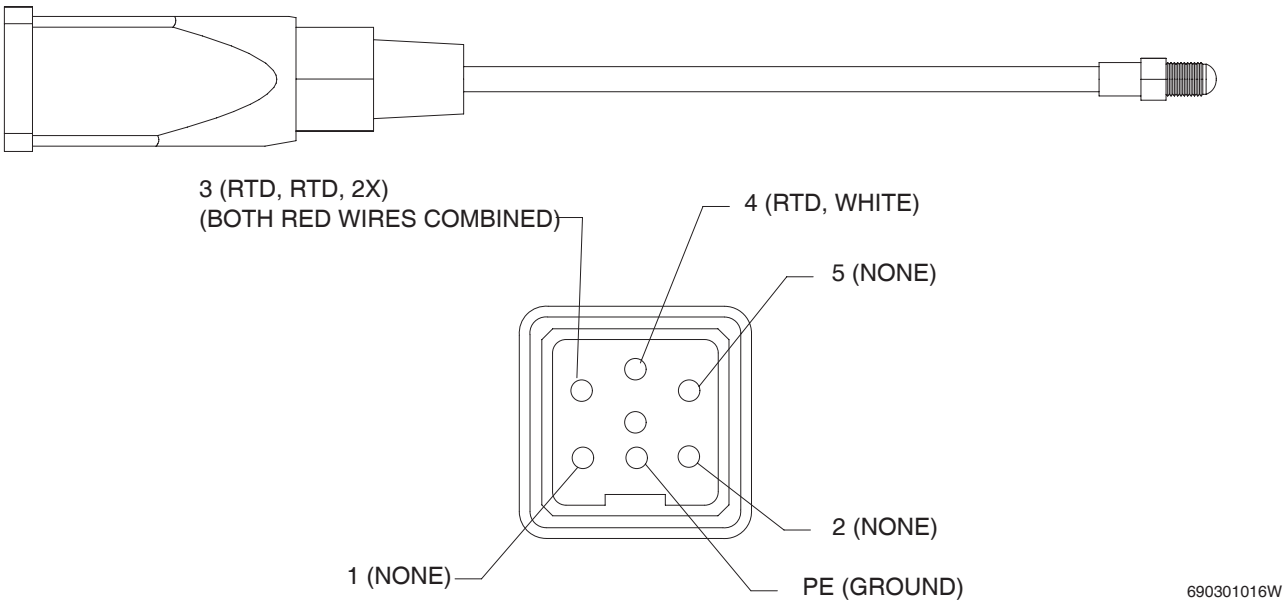


Figure 8-14 Pump temperature sensor assembly

Solenoid Valve Assembly

See Figure 8-15. The solenoid valve assembly includes the solenoid valve and the heat isolation gasket.

Item	Part	Description	Quantity	Note
—	- - - - - -	Solenoid valve assembly	AR	A
1	- - - - - -	• Valve, solenoid	1	A
2	- - - - - -	• Gasket, heat isolation	1	A

NOTE A: Refer to Table 8-8 for the part number of this item.

AR: As Required

Table 8-8 Solenoid Valve Assembly Part Numbers

Solenoid Valve Control (see Note)	**Default Output Port (Power Off)**	**Input Voltage**	**Solenoid Valve Assembly Part Number**	**Solenoid Valve Part Number**	**Heat Isolation Gasket Part Number**
Individual module	Port A	24 VDC	1009777	1018411	1016265
Group—dual direction	Port A	24 VDC	1035032	1018411	1034885
Group—single direction	Port A	24 VDC	1014802	1018411	1034886
Individual module	Port B	24 VDC	1003261	1030175	1016265
Group—dual direction	Port B	24 VDC	1035027	1030175	1034885
Group—single direction	Port B	24 VDC	1035028	1030175	1034886

NOTE: All Port A solenoid valves should be used with snuff-back modules. All Port B solenoid valves should be used with non-snuff-back modules.

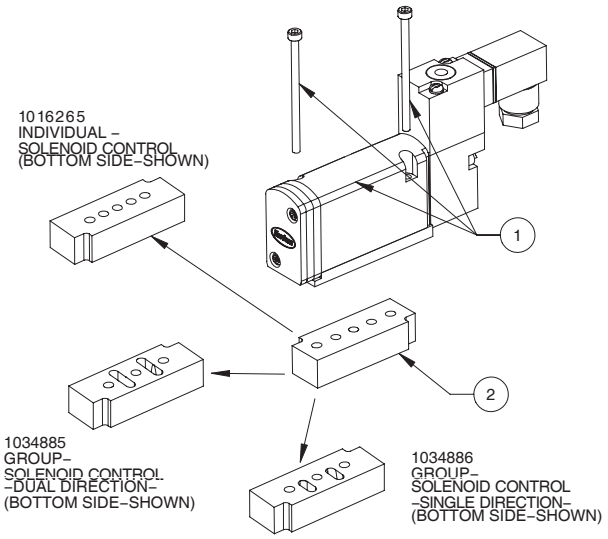


Figure 8-15 Solenoid valve assembly parts

Block-Off Plate Assembly

See Figure 8-16. The block-off plate assembly includes the block-off plate and the gasket.

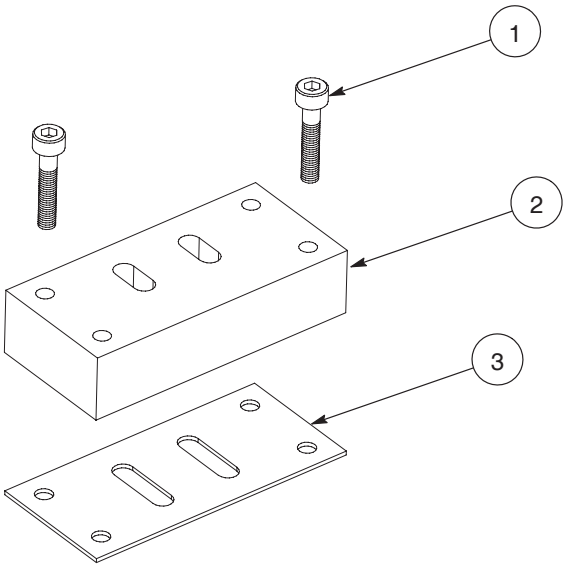
Item	Part	Description	Quantity	Note
—	- - - - - -	Block-off plate assembly	AR	A
1	982658	• Screw, socket, M3 x 16	2	
2	- - - - - -	• Plate, block-off	1	A
3	- - - - - -	• Gasket	1	A

NOTE A: Refer to Table 8-9 for the part number of this item.

AR: As Required

Table 8-9 Block-Off Plate Assembly Part Numbers

Block-Off Plate Control	Applicator Construction	Block-Off Plate Assembly Part Number	Block-Off Plate Part Number	Gasket Part Number
Air flow blocked	Standard	1014270	1027823	1022354
	Stainless-steel	1062220	1034891	1022354



421601013

Figure 8-16 Block-off plate assembly parts

Solenoid Valve Diverter Plate Assembly

See Figure 8-17. This is assembly is required if you want to convert from manifold-mounted solenoid valves to flange-mounted solenoid valves. Refer to *Manifold-Mounted to Flange-Mounted Solenoid Valve Conversion* in Section 7, *Repair.*

Item	Part	Description	Quantity	Note
—	1050296	Solenoid diverter plate assembly	AR	
1	1050295	• Plate, solenoid input diverter	1	
2	1050298	• Gasket, solenoid diverter plate	1	
3	982611	• Screw, socket, M3.0.5 x 18	2	
AR: As Required				

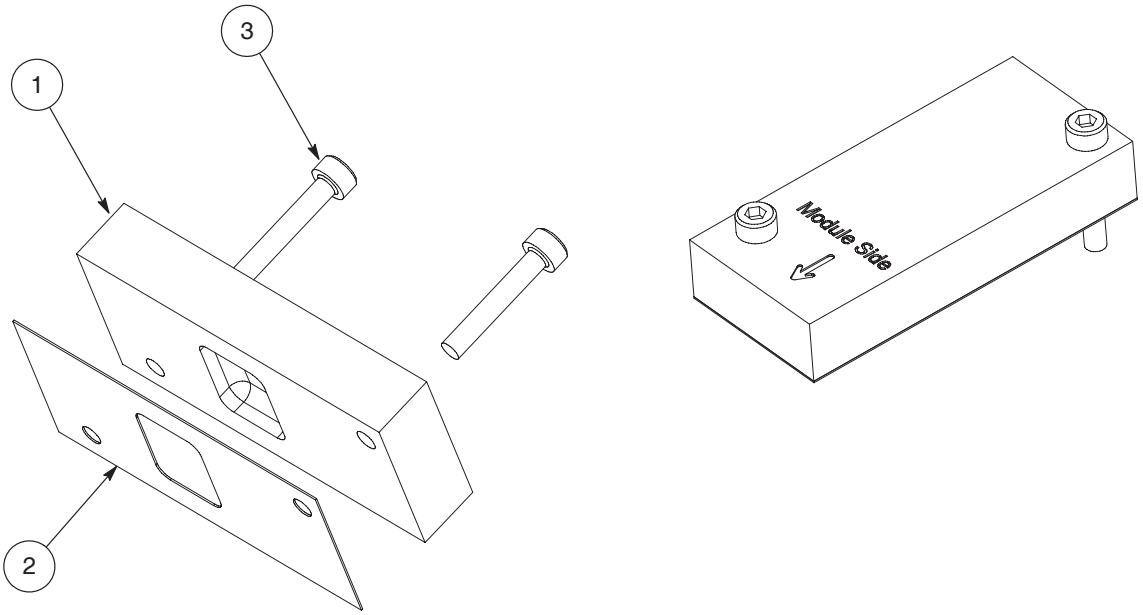


Figure 8-17 Solenoid valve diverter plate assembly parts

Dispensing Module Assemblies

Refer to the module documentation for all module assembly parts lists, including the block-off module parts list.

Optional Pressure Transducer Assemblies

The optional pressure transducer assemblies include the standard pressure transducer, the miniature pressure transducer, and the pressure transducer plug.

Pressure Transducer Part Numbers

See Figure 8-18.

Item	Part	Description	Quantity	Note
1	1013235	Pressure transducer, standard, $^1/_2$-20, 4–20 mA	AR	
	1013234	Pressure transducer, standard, $^1/_2$-20, 0–10 VDC	AR	
	1013236	Pressure transducer, standard, $^1/_2$-20, 3.33 mV/V	AR	
2	1048110	Pressure transducer, miniature, high-speed, 4–20 mA	AR	
	1074650	Pressure transducer, miniature, high-speed, 0–10 VDC	AR	
AR: As Required				

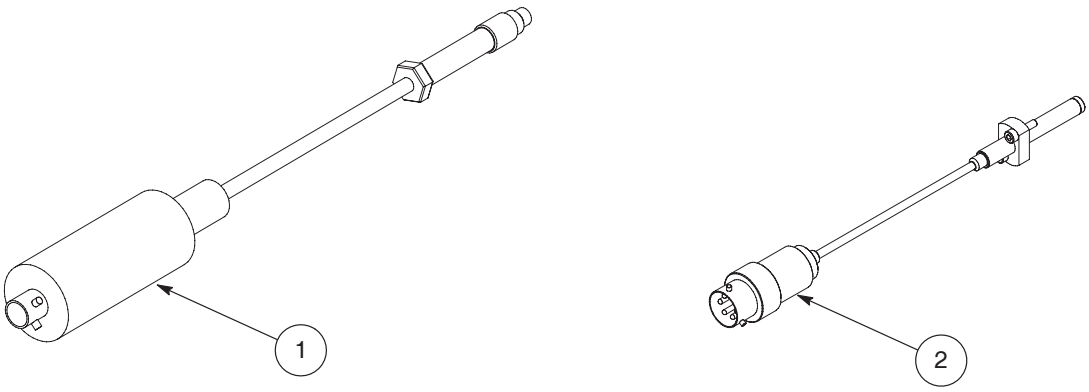


Figure 8-18 Pressure transducer assemblies

Pressure Transducer Plug Parts

See Figure 8-19.

Item	Part	Description	Quantity	Note
—	1010191	Plug assembly, pressure transducer, pre-filter, 1.34 in. long	—	
1	1035091	• Fitting, adapter, 1.34 in. long	1	
2	1062567	• Kit, pump transducer plug	1	A
2A	1036232	• • Screw, socket, cap, M2.5 x 10	2	
2B	1028019	• • Seal, crush, transducer	1	
—	1010192	Plug assembly, pressure transducer, post-filter, 1.75 in. long	—	
1	1026180	• Fitting, adapter, 1.75 in. long	1	
2	1062567	• Kit, pump transducer plug	1	A
2A	1036232	• • Screw, socket, cap, M2.5 x 10	2	
2B	1028019	• • Seal, crush, transducer	1	
NOTE A: This plug is installed in each pump. If desired, it can be replaced with a miniature pressure transducer.				

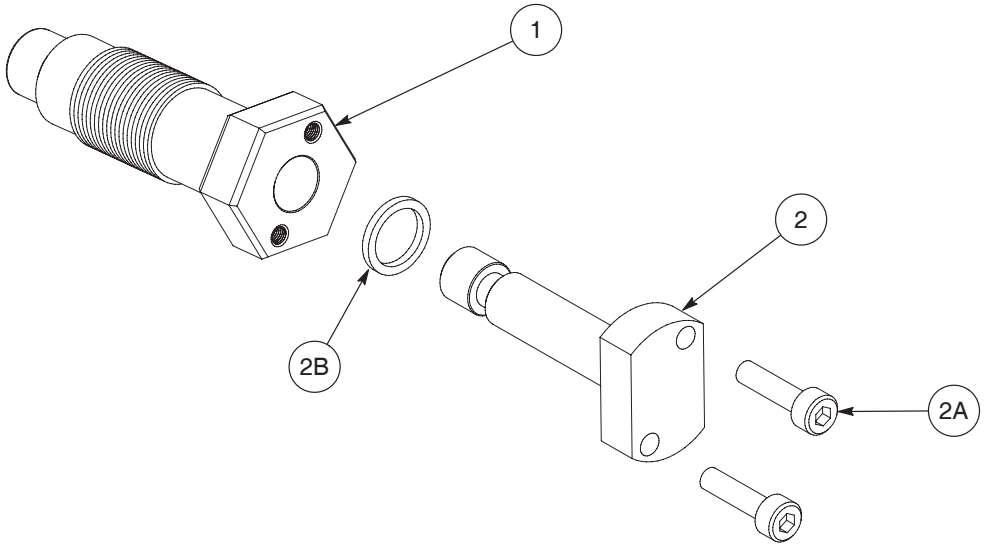


Figure 8-19 Pressure transducer plug assembly parts

Connecting Cables

The cables in these parts lists can be used to make the connections between the applicator and control system(s) as follows:

- **Splitter cables** can be connected to the slice applicator cordsets so that extension cables can then be used to connect the splitter cables to the control system. See Figure 8-20 for an example.
- **Extension cables** are used to connect splitter cables to the control system. See Figure 8-20 for an example.
- **Motor cables** are used to connect the slice applicator motors to the motor control system.
- **Pressure transducer cables** are used to connect any pressure transducers on the slice applicator to the control system or other pressure monitoring device.

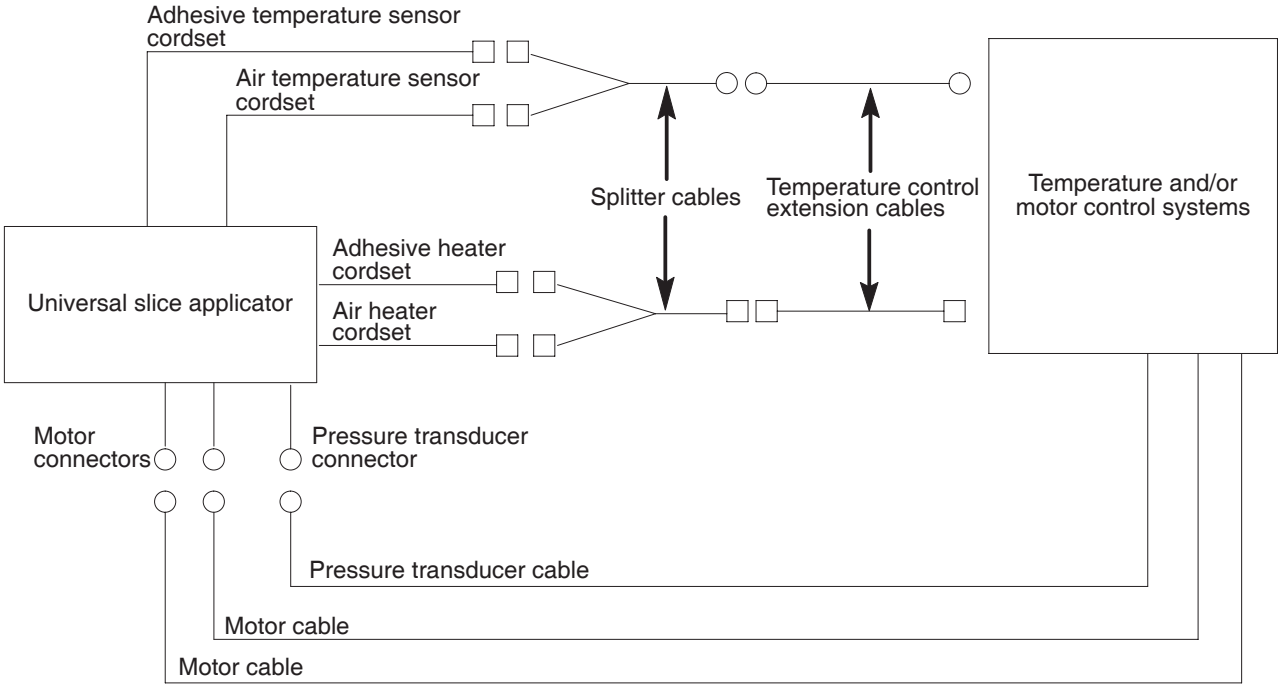


Figure 8-20 Example of how extension and splitter cables are used to connect the applicator cordsets/connectors to a control system

Splitter Cables

See Figure 8-21.

Item	Part	Description	Quantity	Note
1	1010739	Splitter cable, M-style, applicator adhesive cordset to adhesive extension cables	AR	
2	1010870	Splitter cable, M-style, applicator air cordset to air extension cables	AR	
AR: As Required				

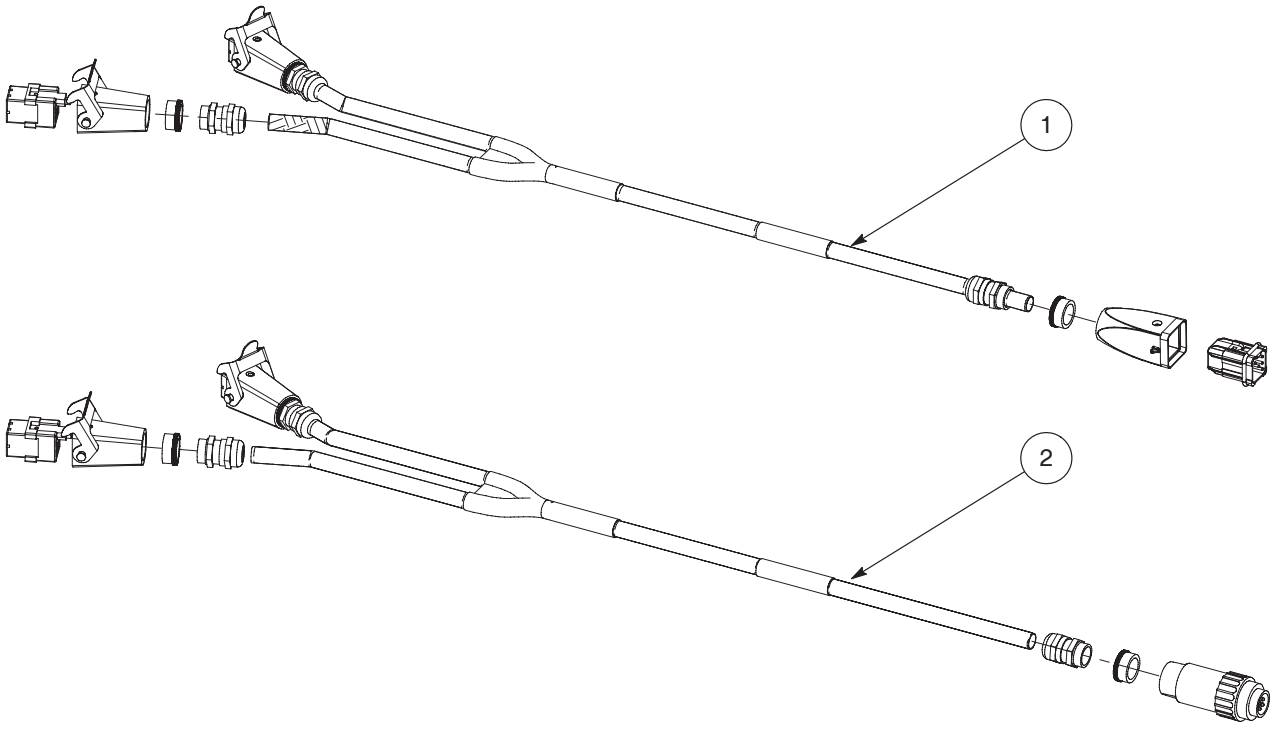


Figure 8-21 Splitter cables

Extension Cables

See Figures 8-22 and 8-23.

Part	Description	Note
265217	Extension cable, M-style, adhesive cordsets, 5 m (16.4 ft)	
261411	Extension cable, M-style, adhesive cordsets, 7 m (23.0 ft)	
268242	Extension cable, M-style, adhesive cordsets, 8 m (26.2 ft)	
264467	Extension cable, M-style, adhesive cordsets, 10 m (32.8 ft)	
446703	Extension cable, M-style, adhesive cordsets, 12 m (39.4 ft)	
8012045	Extension cable, M-style, adhesive cordsets, 16 m (52.5 ft)	
265216	Extension cable, M-style, adhesive cordsets, 20 m (65.6 ft)	
257676	Extension cable, M-style, air cordsets, 1 m (3.3 ft)	
291519	Extension cable, M-style, air cordsets, 3 m (9.8 ft)	
446700	Extension cable, M-style, air cordsets, 5 m (16.4 ft)	
257675	Extension cable, M-style, air cordsets, 6 m (19.7 ft)	
267579	Extension cable, M-style, air cordsets, 8 m (26.2 ft)	
256259	Extension cable, M-style, air cordsets, 9 m (29.5 ft)	
261743	Extension cable, M-style, air cordsets, 10 m (32.8 ft)	
267067	Extension cable, M-style, air cordsets, 12 m (39.4 ft)	
283427	Extension cable, M-style, air cordsets, 15 m (49.2 ft)	
267066	Extension cable, M-style, air cordsets, 16 m (52.5 ft)	
292242	Extension cable, M-style, air cordsets, 20 m (65.6 ft)	
317676	Extension cable, M-style, air cordsets, 25 m (82.0 ft)	

Figure 8-22 M-style adhesive cordset extension cable

Figure 8-23 M-style air cordset extension cable

Motor Cables

Part	Description	Note
1006844	Cable, servo, ULTRA 100, power, 3 m (9.8 ft)	
1010187	Cable, servo, ULTRA 100, power, 7.6 m (25.0 ft)	
1006846	Cable, servo, ULTRA 100, power, 15 m (49.2 ft)	
1006847	Cable, servo, ULTRA 100, power, 23 m (75.5 ft)	
1006848	Cable, servo, ULTRA 100, power, 30 m (98.4 ft)	
1006897	Cable, servo, ULTRA 100, encoder, 3 m (9.8 ft)	
1006898	Cable, servo, ULTRA 100, encoder, 7.6 m (25.0 ft)	
1006899	Cable, servo, ULTRA 100, encoder, 15 m (49.2 ft)	
1006842	Cable, servo, ULTRA 100, encoder, 23 m (75.5 ft)	
1006843	Cable, servo, ULTRA 100, encoder, 30 m (98.4 ft)	

Pressure Transducer Cables

See Figure 8-24.

Item	Part	Description	Quantity	Note
1	1002847	Cable, pressure transducer, 3 m (10 ft)	AR	

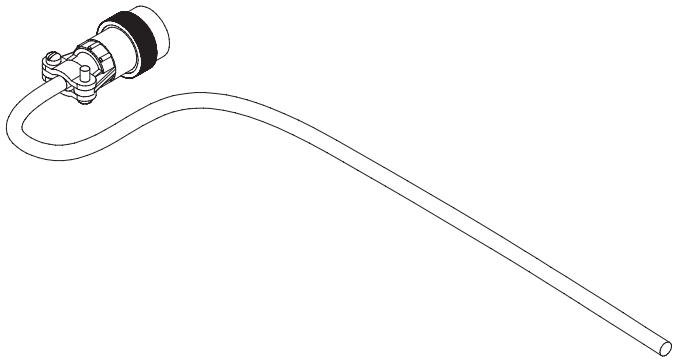


Figure 8-24 Pressure transducer cable

Section 9
Technical Data

Applicator Specifications

Applicator System	Item	Specification
Hydraulic system	Minimum operating temperature (ambient)	25 °C (77 °F)
	Maximum operating temperature	204 °C (400 °F)
	Adhesive viscosity	15,000 cps
	Minimum adhesive input pressure	3.4 bar (50 psi)
	Maximum adhesive input pressure	103.4 bar (1,500 psi)
	Nominal operating adhesive input pressure	10.3–20.7 bar (150–300 psi)
	Rupture disk burst pressure (maximum adhesive output pressure)	114 bar (1,650 psi) at 163 °C (325 °F), ±3% tolerance
Pneumatic system	Minimum module-actuating air pressure	5.2 bar (75 psi)
	Maximum module-actuating air pressure	6.2 bar (90 psi)
	Nominal module-actuating air pressure	5.5 bar (80 psi)
	Minimum pattern air pressure	0.1 bar (1 psi)
	Maximum pattern air pressure	6.9 bar (100 psi)
	Nominal pattern air pressure	0.7–4.1 bar (10–60 psi)
	Maximum differential pressure	5.2 bar (75 psi)
Electrical system	Supply voltage	240 VAC
	Heated zones	One adhesive; one pattern air
	Temperature sensors	100-ohm platinum RTD, 120-ohm nickel RTD, or J-type thermocouple
	Power consumption (heaters)	Refer to *Heater Wattages* later in this section.
	Solenoid valve input voltage	24 VDC or 110 VAC

Continued...

Applicator Specifications *(contd)*

Applicator System	Item	Specification
Motor	Motor type	Servo
	Motor frame size	NEMA 34
	Motor continuous stall torque	1.5 N•m (13 in.-lb)
	Motor peak torque	4.1 N•m (36 in.-lb)
	Gear reducer	Single reduction planetary gear
Pumps **NOTE:** When ordering a pump, choose a pump size that will allow you to achieve the desired flow rate at a pump speed as close to 60 rpm as possible. Sixty rpm is the speed at which the greatest pump efficiency is obtained.	Minimum pump speed	10 rpm
	Maximum pump speed	150 rpm
	Recommended pump speed	60 rpm
	Maximum output torque	34.6 N•m (300 in.-lb)
Pattern control	Minimum pattern width per module	0.3175 cm (0.125 in.)
	Maximum pattern width per module	25 mm (0.98 in.)

Fluid Compatibility:

Rated for use with all commercially available, pressure sensitive, hot melt adhesives, with the exception of any compounds that contain polyamides.

Disclaimer:

The equipment specifications above will be under warranty according to Nordson standard agreements. Nordson will cover the cost of repair and or replacement of the equipment due to failure. However, due to situations beyond our control, such as misuse, equipment modification, unreasonable use, neglect, and lack of maintenance, Nordson will not be liable for personal injuries and associated cost thereof due to equipment failure under such conditions.

Nomenclature:

Cv—pneumatic conductance is reported as a number expressing the ability of a fluid to flow under a Δ_p (pressure drop) and is often referred to as flow capability, or more commonly known as flow coefficient.

Applicator Dimensions

Refer to the applicator-specific drawing provided with this manual for the dimensions of your applicator.

Torque Specifications

These torque specifications are also stated within the appropriate repair procedures.

Fastener	Torque Specification
Block-off plate screws	1.9–2.5 N•m (17–22 in.-lbs)
Adhesive diverter plate bolts	10–12 N•m (89–106 in.-lb)
Filter block base bolts	12.4 N•m (110 in.-lb)
Filter block cap bolts	12.4 N•m (110 in.-lb)
Flow meter bolts	12.4 N•m (110 in.-lb)
Manifold end slice bolts	12.4 N•m (110 in.-lb)
Manifold (middle) slice bolts	10.7 N•m (95 in.-lb)
Module screws	3–4 N•m (25–32 in.-lb)
Pump clamp bolt	24–25 N•m (213–221 in.-lb)
Pump shaft end cap bolts (non brass)	10–12 N•m (89–106 in.-lb)
Pump shaft end cap bolts (brass)	10.7 N•m (95 in.-lb)
Rupture disk	5.6 N•m (50 in.-lb)
Solenoid valve diverter plate screws	1.9–2.5 N·m (17–22 in.-lbs)

Wiring Diagrams

Electrical Schematic

Refer to the reference drawings provided with the applicator.

Cordset Pin Positions

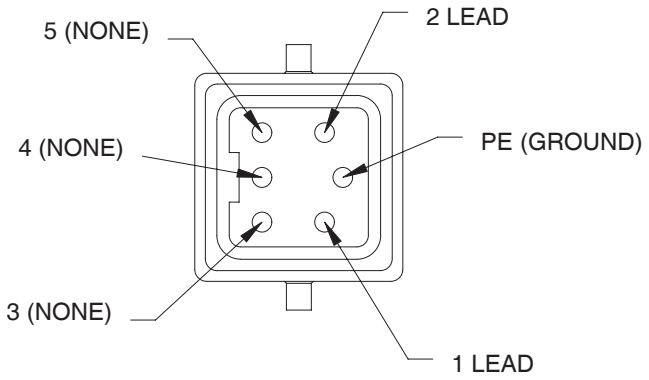


Figure 9-1 Adhesive and air heater cordset pins

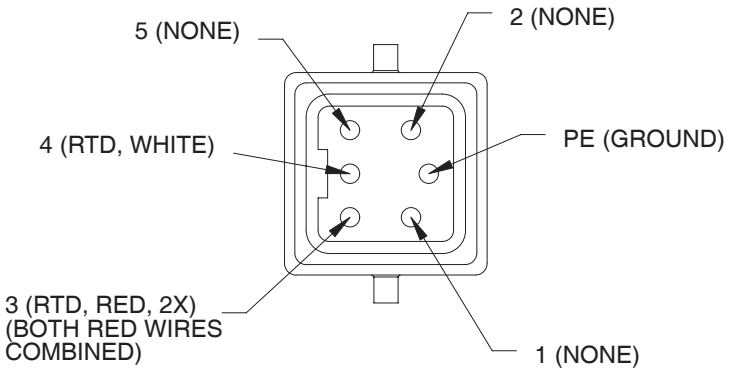


Figure 9-2 Fixed-depth sensor cordset pins

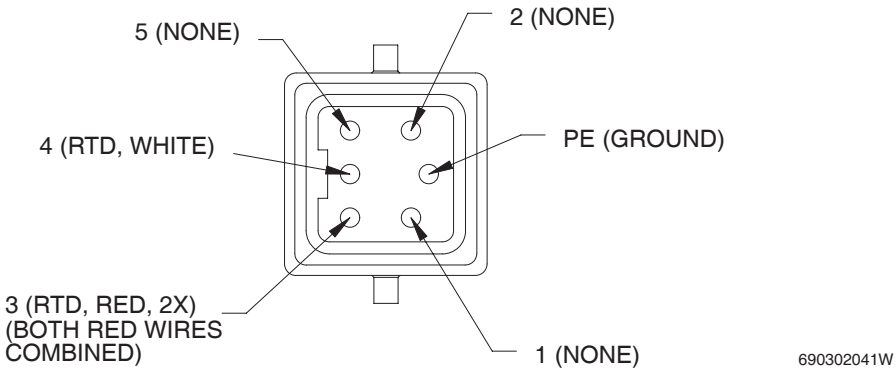


Figure 9-3 Optional immersion sensor cordset pins

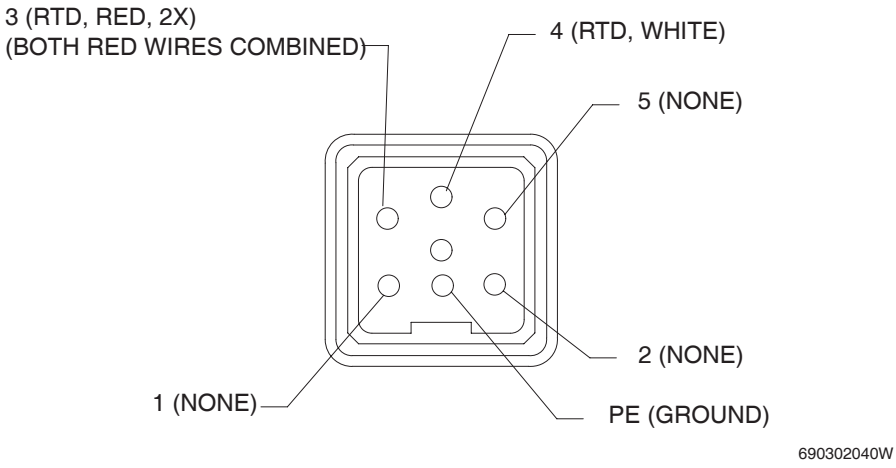


Figure 9-4 Optional pump sensor cordset pins

Cordset Pin Positions *(contd)*

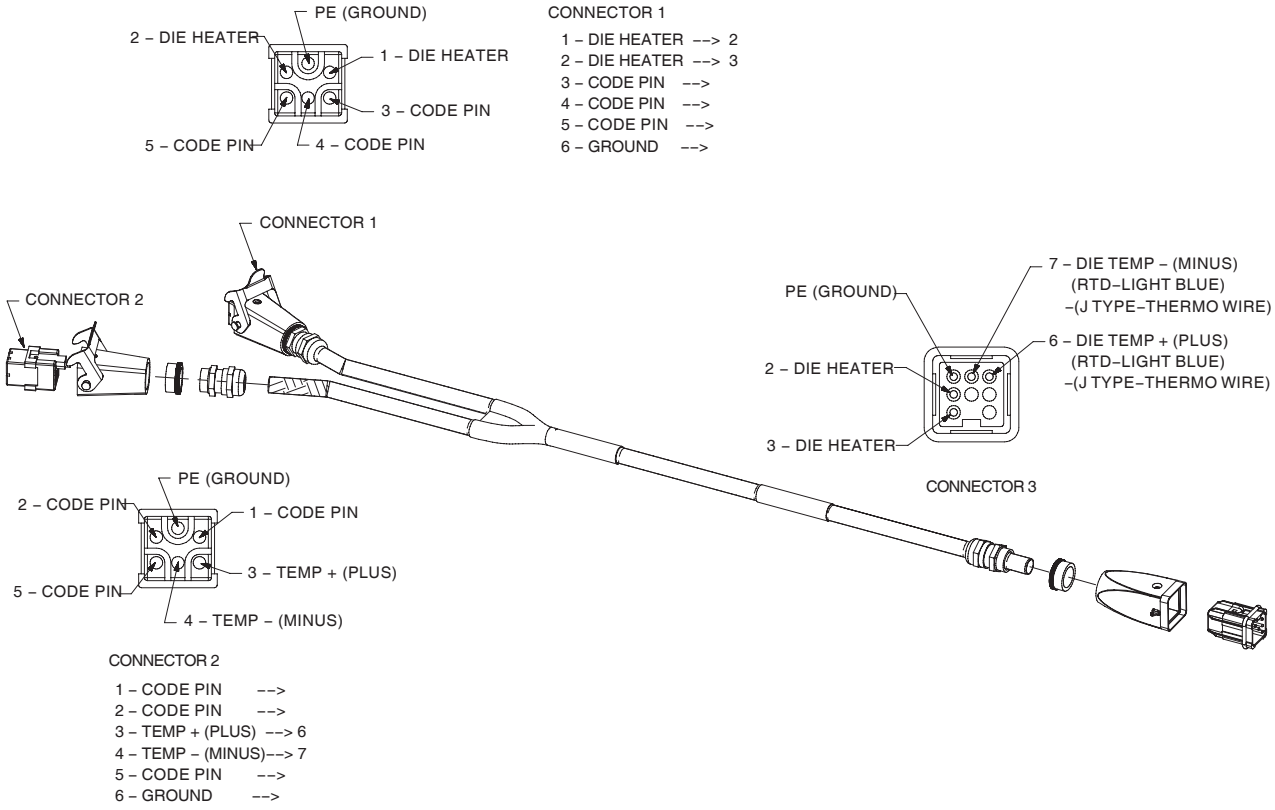


Figure 9-5 M-style splitter cable cordset pin positions (applicator adhesive cordset to adhesive extension cables)

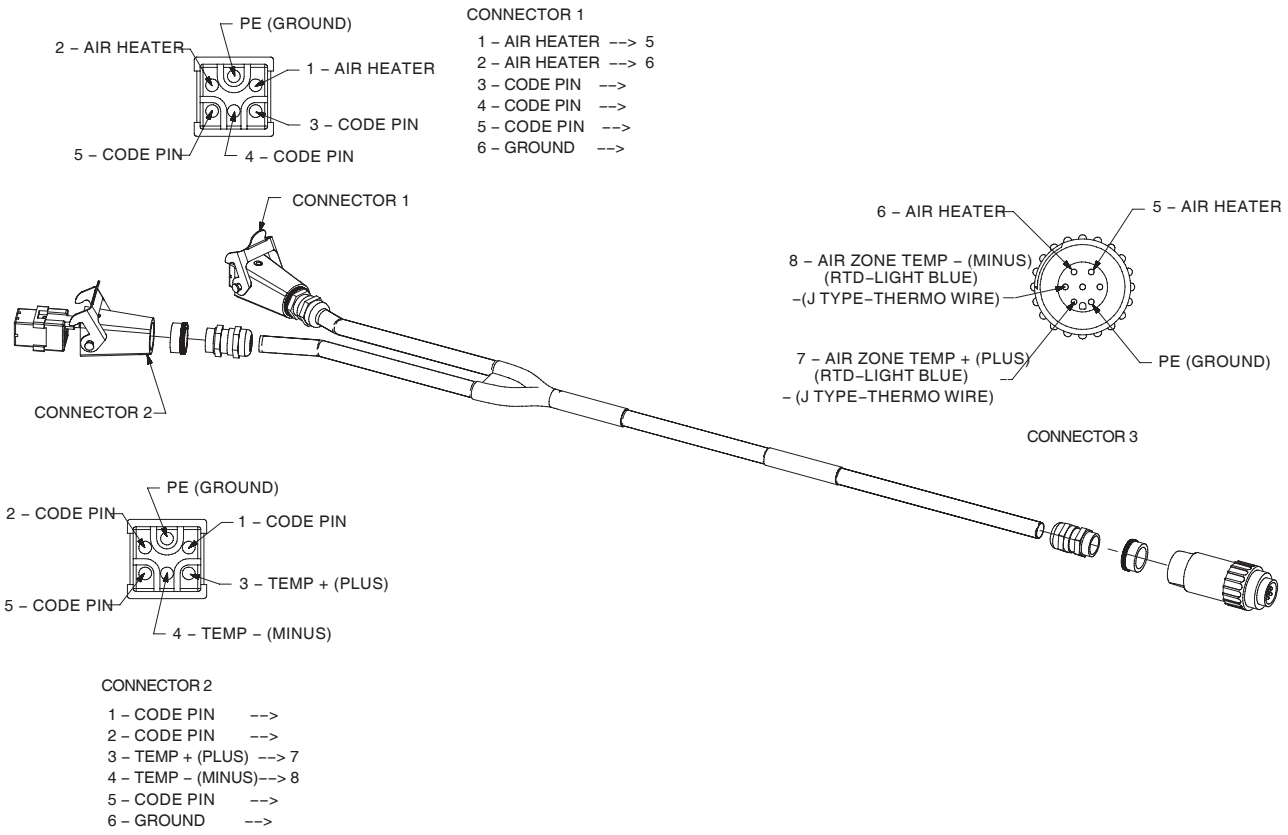


Figure 9-6 M-style splitter cable cordset pin positions (applicator air cordset to air extension cables)

Heater Wattages

Number of Slices	Adhesive Manifold Heater Wattage	Heated Air Manifold Heater Wattage	Total Wattage
1	510	596	1106
2	630	716	1346
3	750	836	1586
4	870	956	1826
5	990	1076	2066
6	1110	1196	2306
7	1230	1316	2546
8	1350	1436	2786
9	1470	1556	3026
10	1590	1676	3266
11	1710	1796	3506
12	1830	1916	3746
13	1950	2036	3986
14	2070	2156	4226
15	2190	2276	4466
16	2340	2396	4736
17	2490	2516	5006
18	2640	2636	5276
19	2790	2756	5546
20	2940	2876	5816

UM3 Dispensing Module

Customer Product Manual
Part 1058578B02
Issued 5/07

This equipment is regulated by the European Union under WEEE Directive 2002/96/EC).

See www.nordson.com for information about how to properly dispose of this equipment.

NORDSON CORPORATION • DAWSONVILLE, GEORGIA • USA
www.nordson.com

CE

For CE Declaration, refer to applicator manual.

Nordson Corporation welcomes requests for information, comments and inquiries about its products.
General information about Nordson can be found on the Internet using the following address:
http://www.nordson.com.

Address all correspondence to:

Nordson Corporation
Attn: Nonwovens Marketing Department
12 Nordson Drive
Dawsonville, GA 30534

Notice

Trademarks

Table of Contents

UM3 Dispensing Module

Safety

Read this section before using the equipment. This section contains recommendations and practices applicable to the safe installation, operation, and maintenance (hereafter referred to as “use”) of the product described in this document (hereafter referred to as “equipment”). Additional safety information, in the form of task-specific safety alert messages, appears as appropriate throughout this document.

WARNING: Failure to follow the safety messages, recommendations, and hazard avoidance procedures provided in this document can result in personal injury, including death, or damage to equipment or property.

Safety Alert Symbols

The following safety alert symbol and signal words are used throughout this document to alert the reader to personal safety hazards or to identify conditions that may result in damage to equipment or property. Comply with all safety information that follows the signal word.

WARNING: Indicates a potentially hazardous situation that, if not avoided, can result in serious personal injury, including death.

CAUTION: Indicates a potentially hazardous situation that, if not avoided, can result in minor or moderate personal injury.

CAUTION: (Used without the safety alert symbol) Indicates a potentially hazardous situation that, if not avoided, can result in damage to equipment or property.

Responsibilities of the Equipment Owner

Equipment owners are responsible for managing safety information, ensuring that all instructions and regulatory requirements for use of the equipment are met, and for qualifying all potential users.

Safety Information

- Research and evaluate safety information from all applicable sources, including the owner-specific safety policy, best industry practices, governing regulations, material manufacturer's product information, and this document.
- Make safety information available to equipment users in accordance with governing regulations. Contact the authority having jurisdiction for information.
- Maintain safety information, including the safety labels affixed to the equipment, in readable condition.

Instructions, Requirements, and Standards

- Ensure that the equipment is used in accordance with the information provided in this document, governing codes and regulations, and best industry practices.
- If applicable, receive approval from your facility's engineering or safety department, or other similar function within your organization, before installing or operating the equipment for the first time.
- Provide appropriate emergency and first aid equipment.
- Conduct safety inspections to ensure required practices are being followed.
- Re-evaluate safety practices and procedures whenever changes are made to the process or equipment.

User Qualifications

Equipment owners are responsible for ensuring that users:

- receive safety training appropriate to their job function as directed by governing regulations and best industry practices
- are familiar with the equipment owner's safety and accident prevention policies and procedures
- receive, equipment- and task-specific training from another qualified individual

  NOTE: Nordson can provide equipment-specific installation, operation, and maintenance training. Contact your Nordson representative for information

- possess industry- and trade-specific skills and a level of experience appropriate to their job function
- are physically capable of performing their job function and are not under the influence of any substance that degrades their mental capacity or physical capabilities

Applicable Industry Safety Practices

The following safety practices apply to the use of the equipment in the manner described in this document. The information provided here is not meant to include all possible safety practices, but represents the best safety practices for equipment of similar hazard potential used in similar industries.

Intended Use of the Equipment

- Use the equipment only for the purposes described and within the limits specified in this document.
- Do not modify the equipment.
- Do not use incompatible materials or unapproved auxiliary devices. Contact your Nordson representative if you have any questions on material compatibility or the use of non-standard auxiliary devices.

Instructions and Safety Messages

- Read and follow the instructions provided in this document and other referenced documents.
- Familiarize yourself with the location and meaning of the safety warning labels and tags affixed to the equipment. Refer to *Safety Labels and Tags* at the end of this section.
- If you are unsure of how to use the equipment, contact your Nordson representative for assistance.

Installation Practices

- Install the equipment in accordance with the instructions provided in this document and in the documentation provided with auxiliary devices.
- Ensure that the equipment is rated for the environment in which it will be used and that the processing characteristics of the material will not create a hazardous environment. Refer to the Material Safety Data Sheet (MSDS) for the material.
- If the required installation configuration does not match the installation instructions, contact your Nordson representative for assistance.
- Position the equipment for safe operation. Observe the requirements for clearance between the equipment and other objects.
- Install lockable power disconnects to isolate the equipment and all independently powered auxiliary devices from their power sources.
- Properly ground all equipment. Contact your local building code enforcement agency for specific requirements.
- Ensure that fuses of the correct type and rating are installed in fused equipment.
- Contact the authority having jurisdiction to determine the requirement for installation permits or inspections.

Operating Practices

- Familiarize yourself with the location and operation of all safety devices and indicators.
- Confirm that the equipment, including all safety devices (guards, interlocks, etc.), is in good working order and that the required environmental conditions exist.
- Use the personal protective equipment (PPE) specified for each task. Refer to *Equipment Safety Information* or the material manufacturer's instructions and MSDS for PPE requirements.
- Do not use equipment that is malfunctioning or shows signs of a potential malfunction.

Maintenance and Repair Practices

- Perform scheduled maintenance activities at the intervals described in this document.
- Relieve system hydraulic and pneumatic pressure before servicing the equipment.
- De-energize the equipment and all auxiliary devices before servicing the equipment.
- Use only new factory-authorized refurbished or replacement parts.
- Read and comply with the manufacturer's instructions and the MSDS supplied with equipment cleaning compounds.

  NOTE: MSDSs for cleaning compounds that are sold by Nordson are available at www.nordson.com or by calling your Nordson representative.

- Confirm the correct operation of all safety devices before placing the equipment back into operation.
- Dispose of waste cleaning compounds and residual process materials according to governing regulations. Refer to the applicable MSDS or contact the authority having jurisdiction for information.
- Keep equipment safety warning labels clean. Replace worn or damaged labels.

Equipment Safety Information

This equipment safety information is applicable to the following types of Nordson equipment:

- hot melt and cold adhesive application equipment and all related accessories
- pattern controllers, timers, detection and verification systems, and all other optional process control devices

Equipment Shutdown

To safely complete many of the procedures described in this document, the equipment must first be shut down. The level of shut down required varies by the type of equipment in use and the procedure being completed. If required, shut down instructions are specified at the start of the procedure. The levels of shut down are:

Relieving System Hydraulic Pressure

Completely relieve system hydraulic pressure before breaking any hydraulic connection or seal. Refer to the melter-specific product manual for instructions on relieving system hydraulic pressure.

De-energizing the System

Isolate the system (melter, hoses, guns, and optional devices) from all power sources before accessing any unprotected high-voltage wiring or connection point.

1. Turn off the equipment and all auxiliary devices connected to the equipment (system).
2. To prevent the equipment from being accidentally energized, lock and tag the disconnect switch(es) or circuit breaker(s) that provide input electrical power to the equipment and optional devices.

   NOTE: Government regulations and industry standards dictate specific requirements for the isolation of hazardous energy sources. Refer to the appropriate regulation or standard.

Disabling the Guns

All electrical or mechanical devices that provide an activation signal to the guns, gun solenoid valve(s), or the melter pump must be disabled before work can be performed on or around a gun that is connected to a pressurized system.

1. Turn off or disconnect the gun triggering device (pattern controller, timer, PLC, etc.).
2. Disconnect the input signal wiring to the gun solenoid valve(s).
3. Reduce the air pressure to the gun solenoid valve(s) to zero; then relieve the residual air pressure between the regulator and the gun.

General Safety Warnings and Cautions

Table 1 contains the general safety warnings and cautions that apply to Nordson hot melt and cold adhesive equipment. Review the table and carefully read all of the warnings or cautions that apply to the type of equipment described in this manual.

Equipment types are designated in Table 1 as follows:

HM = Hot melt (melters, hoses, guns, etc.)

PC = Process control

CA = Cold adhesive (dispensing pumps, pressurized container, and guns)

Table 1 General Safety Warnings and Cautions

Equipment Type	Warning or Caution
HM	**WARNING:** Hazardous vapors! Before processing any polyurethane reactive (PUR) hot melt or solvent-based material through a compatible Nordson melter, read and comply with the material's MSDS. Ensure that the material's processing temperature and flashpoints will not be exceeded and that all requirements for safe handling, ventilation, first aid, and personal protective equipment are met. Failure to comply with MSDS requirements can cause personal injury, including death.
HM	**WARNING:** Reactive material! Never clean any aluminum component or flush Nordson equipment with halogenated hydrocarbon fluids. Nordson melters and guns contain aluminum components that may react violently with halogenated hydrocarbons. The use of halogenated hydrocarbon compounds in Nordson equipment can cause personal injury, including death.
HM, CA	**WARNING:** System pressurized! Relieve system hydraulic pressure before breaking any hydraulic connection or seal. Failure to relieve the system hydraulic pressure can result in the uncontrolled release of hot melt or cold adhesive, causing personal injury.
HM	**WARNING:** Molten material! Wear eye or face protection, clothing that protects exposed skin, and heat-protective gloves when servicing equipment that contains molten hot melt. Even when solidified, hot melt can still cause burns. Failure to wear appropriate personal protective equipment can result in personal injury.

Continued...

General Safety Warnings and Cautions (contd)

Table 1 General Safety Warnings and Cautions *(contd)*

Equipment Type	Warning or Caution
HM, PC	**WARNING:** Equipment starts automatically! Remote triggering devices are used to control automatic hot melt guns. Before working on or near an operating gun, disable the gun's triggering device and remove the air supply to the gun's solenoid valve(s). Failure to disable the gun's triggering device and remove the supply of air to the solenoid valve(s) can result in personal injury.
HM, CA, PC	**WARNING:** Risk of electrocution! Even when switched off and electrically isolated at the disconnect switch or circuit breaker, the equipment may still be connected to energized auxiliary devices. De-energize and electrically isolate all auxiliary devices before servicing the equipment. Failure to properly isolate electrical power to auxiliary equipment before servicing the equipment can result in personal injury, including death.
HM, CA, PC	**WARNING:** Risk of fire or explosion! Nordson adhesive equipment is not rated for use in explosive environments and should not be used with solvent-based adhesives that can create an explosive atmosphere when processed. Refer to the MSDS for the adhesive to determine its processing characteristics and limitations. The use of incompatible solvent-based adhesives or the improper processing of solvent-based adhesives can result in personal injury, including death.
HM, CA, PC	**WARNING:** Allow only personnel with appropriate training and experience to operate or service the equipment. The use of untrained or inexperienced personnel to operate or service the equipment can result in injury, including death, to themselves and others and can damage to the equipment.

Continued...

Table 1 General Safety Warnings and Cautions *(contd)*

Equipment Type	Warning or Caution
HM	 **CAUTION:** Hot surfaces! Avoid contact with the hot metal surfaces of guns, hoses, and certain components of the melter. If contact can not be avoided, wear heat-protective gloves and clothing when working around heated equipment. Failure to avoid contact with hot metal surfaces can result in personal injury.
HM	**CAUTION:** Some Nordson melters are specifically designed to process polyurethane reactive (PUR) hot melt. Attempting to process PUR in equipment not specifically designed for this purpose can damage the equipment and cause premature reaction of the hot melt. If you are unsure of the equipment's ability to process PUR, contact your Nordson representative for assistance.
HM, CA	**CAUTION:** Before using any cleaning or flushing compound on or in the equipment, read and comply with the manufacturer's instructions and the MSDS supplied with the compound. Some cleaning compounds can react unpredictably with hot melt or cold adhesive, resulting in damage to the equipment.
HM	**CAUTION:** Nordson hot melt equipment is factory tested with Nordson Type R fluid that contains polyester adipate plasticizer. Certain hot melt materials can react with Type R fluid and form a solid gum that can clog the equipment. Before using the equipment, confirm that the hot melt is compatible with Type R fluid.

Other Safety Precautions

- Do not use an open flame to heat hot melt system components.
- Check high pressure hoses daily for signs of excessive wear, damage, or leaks.
- Never point a dispensing handgun at yourself or others.
- Suspend dispensing handguns by their proper suspension point.

First Aid

If molten hot melt comes in contact with your skin:

1. Do NOT attempt to remove the molten hot melt from your skin.
2. Immediately soak the affected area in clean, cold water until the hot melt has cooled.
3. Do NOT attempt to remove the solidified hot melt from your skin.
4. In case of severe burns, treat for shock.
5. Seek expert medical attention immediately. Give the MSDS for the hot melt to the medical personnel providing treatment.

Safety Labels and Tags

Refer to the applicator manual for the location of the safety labels and tags on the applicator.

Description

This manual provides specifications, troubleshooting, repair, and parts information for the Universal three-way (UM3) dispensing module, which is generally used on metering applicators. The UM3 spray module, either directly or through the use of an adapter, can dispense adhesive in a variety of spray applications, including Controlled Fiberization (CF), meltblown, Summit, and SureWrap applications. The UM3 coating module can be used with a coating nozzle assembly to apply a sheet of adhesive in coating applications, or with a bead nozzle plate for applications that require custom spacing between adhesive beads. Table 2 shows the available UM3 modules. Figure 1 shows the UM3 modules and Figure 2 shows the adapters and nozzles for use with UM3 spray modules.

Table 2 UM3 Modules

Part	Module Type	Construction	Associated Solenoid Valve	See Note
High-Speed Spray Modules				
1057602	Spray, high speed	Standard	None (module only)	A
1050136	Spray, high speed	Standard	Flange-mounted solenoid (FMS)	A, B
Standard Spray Modules				
1057923	Spray, standard	Standard	Manifold-mounted solenoid (MMS)	C
1064076	Spray, standard	Stainless-steel	Manifold-mounted solenoid (MMS)	C
1063237	Spray, standard, right-angle	Standard	Manifold-mounted solenoid (MMS)	D
1064280	Spray, standard, right-angle	Stainless-steel	Manifold-mounted solenoid (MMS)	D
High-Speed Coating Modules				
1057909	Coating, high speed	Standard	None (module only)	A
1055208	Coating, high speed	Standard	Flange-mounted solenoid (FMS)	A, B
Standard Coating Modules				
1057926	Coating, standard	Standard	Manifold-mounted solenoid (MMS)	D
1067140	Coating, standard	Stainless-steel	Manifold-mounted solenoid (MMS)	D
Other Modules				
1077277	Blank, recirculation	Standard	None (module only)	
1077278	Blank, recirculation	Stainless-steel	None (module only)	
1077279	Blank, X200, 3-way	Standard	None (module only)	
1074770	Blank, air-only	Standard	None (module only)	

NOTE A: FMS modules must be used with solenoid valve assembly 1064679. The solenoid valve must be connected to a PLC or control unit that supplies a stabilized 24 VDC signal without spiked output. Higher voltage will damage the solenoid valve.

B: A kit that allows conversion from manifold-mounted solenoid valves to flange-mounted solenoid valves is available. Refer to the Universal slice applicator manual for the conversion kit part number and the conversion procedure. Figure 3 shows the conversion.

C: This module can directly replace module part 1023499 without any changes to the solenoid valve type or the mounting arrangement.

D: This module can directly replace module part 1023197 without any changes to the solenoid valve type or the mounting arrangement.

Description *(contd)*

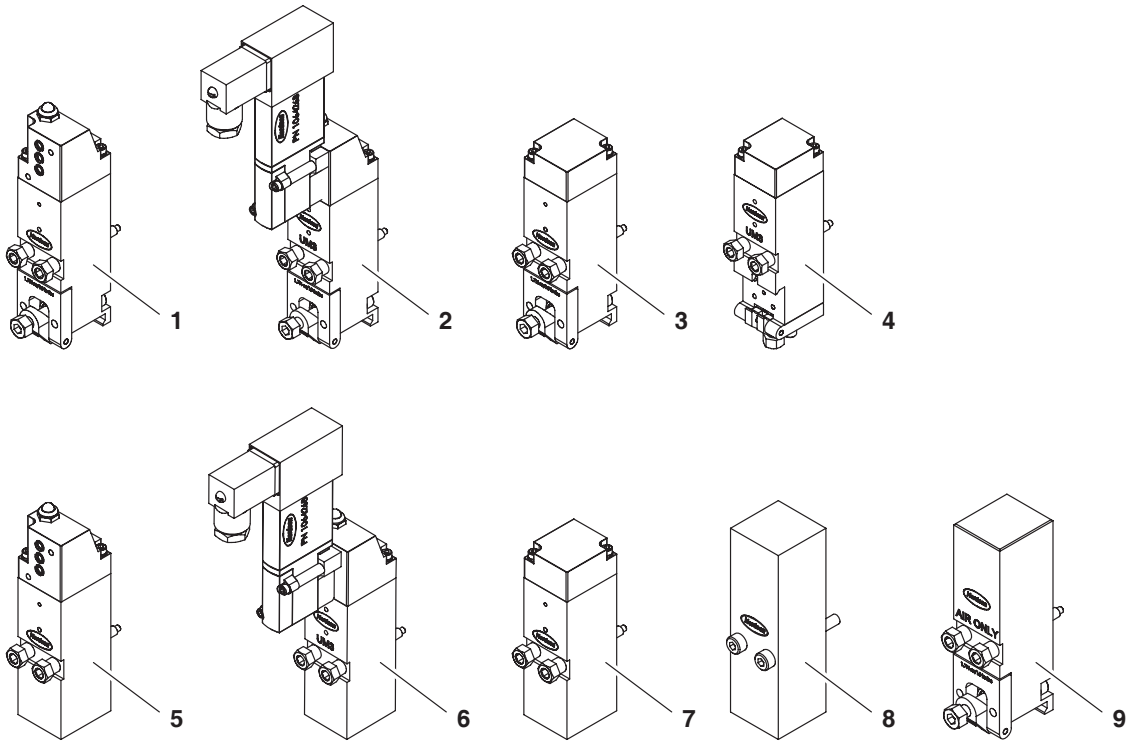


Figure 1 UM3 modules

1. Spray module, high-speed (module only)
2. Spray module, high-speed, FMS
3. Spray module, standard, MMS
4. Spray module, standard, MMS, right-angle
5. Coating module, high-speed (module only)
6. Coating module, high-speed, FMS
7. Coating module, standard, MMS
8. Recirculation or blank module
9. Air-only module

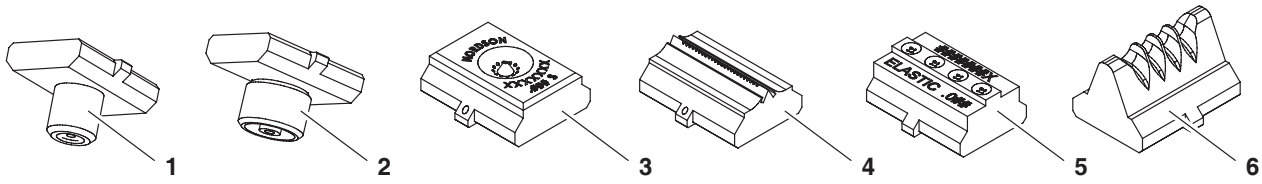


Figure 2 Adapters and nozzles associated with UM3 spray modules

1. Bead adapter (for bead nozzles)
2. CF adapter (for CF disk and unibody nozzles)
3. Universal CF nozzle
4. Meltblown nozzle
5. Summit nozzle
6. SureWrap nozzle

Note: The bead adapter is used in non-spray applications, which are not covered by this manual. For more information on the use of this adapter, contact your Nordson representative.

Note: No adapter is required for Universal CF, meltblown, Summit, and SureWrap nozzles.

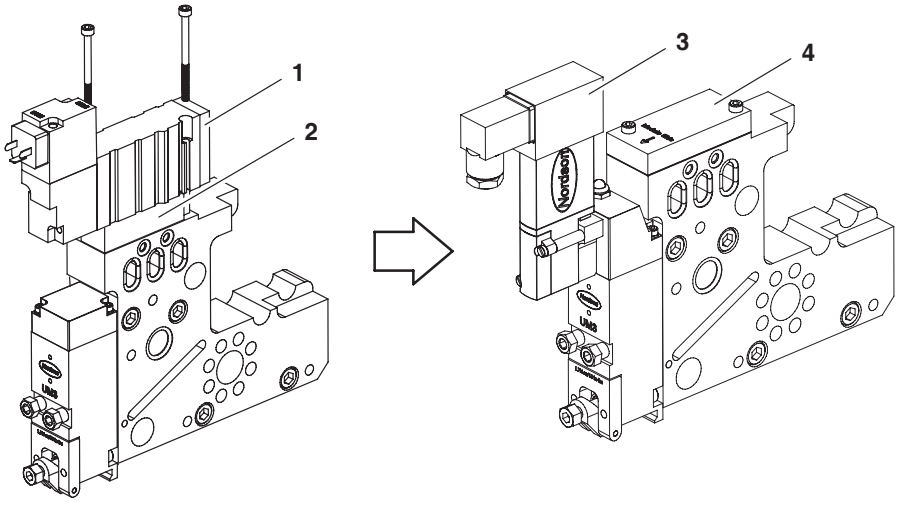


Figure 3 Example of a conversion from a manifold-mounted solenoid valve to a flange-mounted solenoid valve

1. Manifold-mounted solenoid valve
2. Heat isolation gasket
3. UM3 module with flange-mounted solenoid valve
4. Solenoid valve diverter plate assembly

Note: A kit that allows conversion from a manifold-mounted solenoid valve to a flange-mounted solenoid valve is available. Refer to the Universal slice applicator manual for the conversion kit part number and the conversion procedure.

Module Overview

Dispensing modules apply adhesive to a product. Unlike two-way modules, three-way modules recirculate unapplied adhesive back to the feed side of the applicator pump.

All modules are air-actuated (or air-open), meaning that an air supply controlled by a solenoid valve is required to open the module. When the actuating air shuts off, a spring returns the needle-and-piston assembly to the closed position, closing the module.

On UM3 spray modules, a separate air supply is used to supply pattern air to the module; this air enters the pattern air inlet and is directed onto the adhesive exiting the nozzle, creating the desired spray pattern.

Figures 4 and 5 show the flow of adhesive and air through a UM3 spray module and a UM3 coating module. Figures 6 and 7 show the key parts of a module.

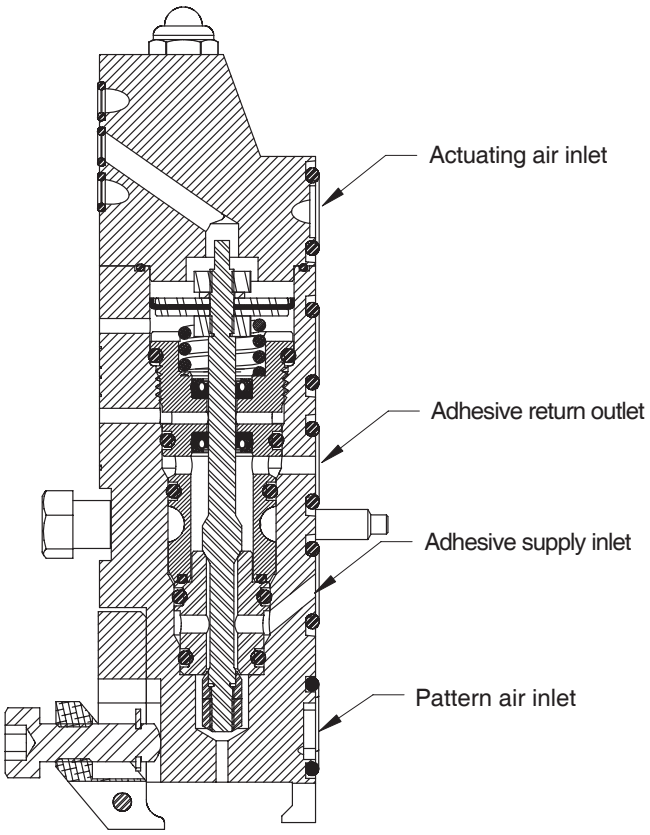


Figure 4 Flow of adhesive and air through a UM3 spray module

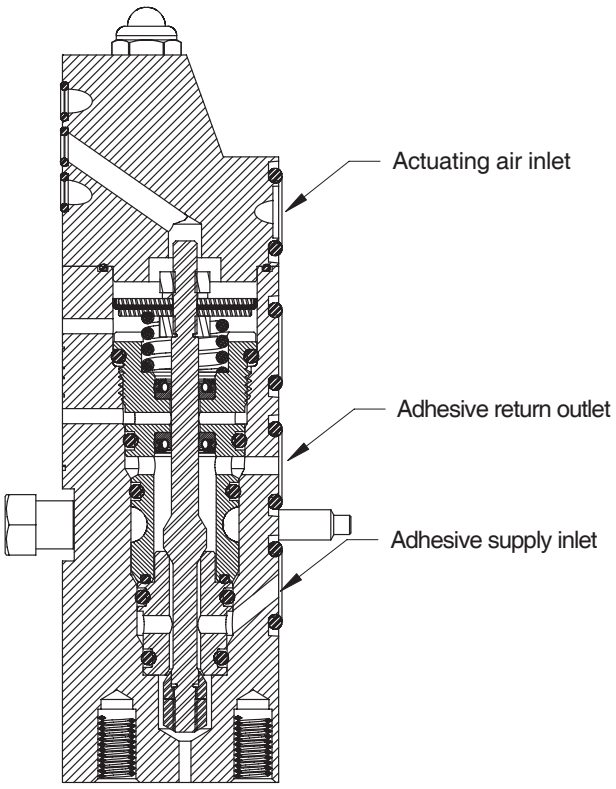


Figure 5 Flow of adhesive and air through a UM3 coating module

Module Overview *(contd)*

CAUTION: The solenoid valve used on flange-mounted solenoid valve (FMS) modules must be connected to a PLC or control unit that supplies a stabilized 24 VDC signal without spiked output. Higher voltage will damage the solenoid valve.

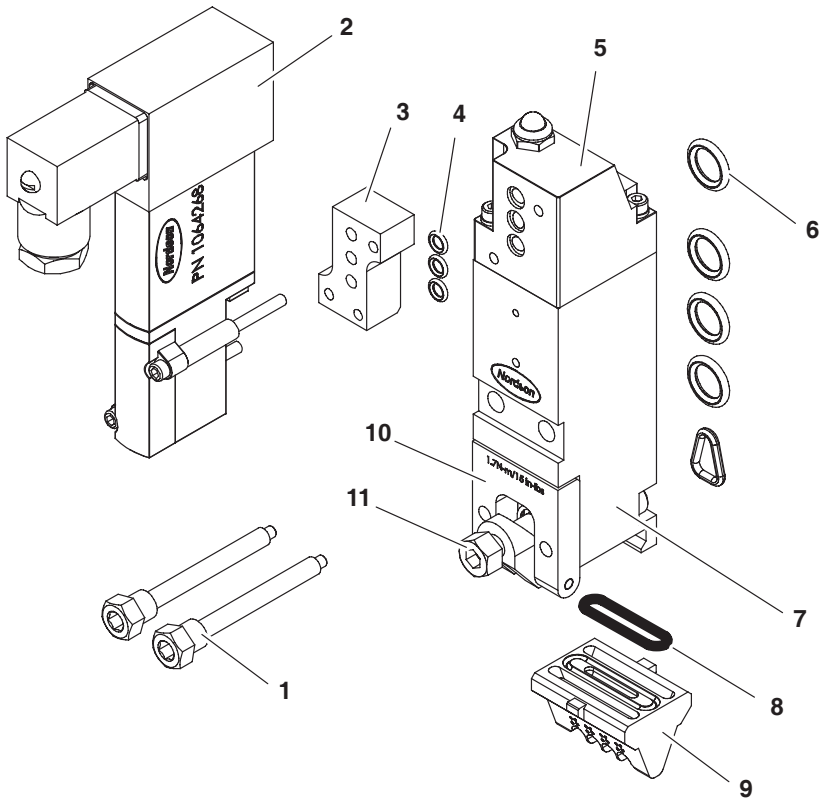


Figure 6 Key parts of a UM3 spray module (high-speed module with flange-mounted solenoid valve shown)

1. Module mounting screws
2. Flange-mounted solenoid valve
3. Heat isolator
4. Heat isolator O-rings
5. Air cap assembly (flange-mounted solenoid valve air cap shown)
6. Module O-rings
7. Module body
8. Nozzle O-ring
9. Nozzle (SureWrap nozzle shown)
10. Nozzle-retaining clamp
11. Nozzle-retaining clamp screw

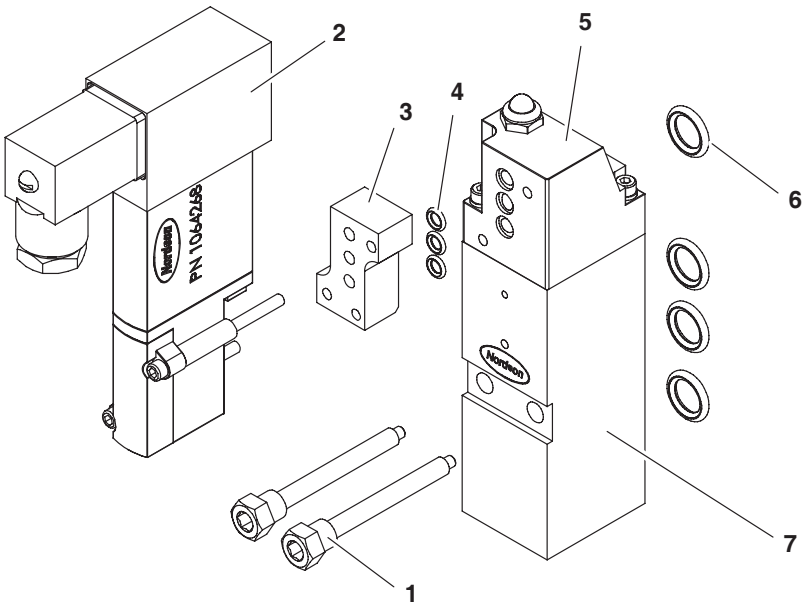


Figure 7 Key parts of a UM3 coating module (high-speed module with flange-mounted solenoid valve shown)

1. Module mounting screws
2. Flange-mounted solenoid valve
3. Heat isolator
4. Heat isolator O-rings
5. Air cap assembly (flange-mounted solenoid valve air cap shown)
6. Module O-rings
7. Module body

Troubleshooting

This section provides tables for troubleshooting module operation and adhesive pattern control problems.

Module Problems

Use this troubleshooting table if you are experiencing problems with module operation. For additional troubleshooting information, refer to the applicator manual.

Problem	Possible Cause	Corrective Action
1. Adhesive leaking from bleed hole on module	Failed O-rings/seals in module (O-rings/seals used beyond expected life)	Replace the module with a new or rebuilt module. Refer to *Replacing a Module* or *Rebuilding a Module*.
	System pressure too high	Adjust the system pressure. **NOTE:** To prevent this condition, regularly check for nozzle plugging.
2. No adhesive output from module	Module stem stuck in closed position; debris or char preventing stem movement	Replace the module with a new or rebuilt module. Refer to *Replacing a Module* or *Rebuilding a Module*.
	Module piston seal worn out	Replace the module with a new or rebuilt module. Refer to *Replacing a Module* or *Rebuilding a Module*.
	Adhesive or debris in piston bore	Replace the module with a new or rebuilt module. Refer to *Replacing a Module* or *Rebuilding a Module*. **NOTE:** To prevent the migration of adhesive into the air supply, ensure that there is no adhesive on the manifold face when a module is replaced.
3. Adhesive output cannot be shut off	Module stem stuck in open position; debris or char preventing stem movement	Replace the module with a new or rebuilt module. Refer to *Replacing a Module* or *Rebuilding a Module*.
	Module piston seal worn out	Replace the module with a new or rebuilt module. Refer to *Replacing a Module* or *Rebuilding a Module*.

Continued...

Problem	Possible Cause	Corrective Action
3. Adhesive output cannot be shut off	Adhesive or debris in piston bore	Replace the module with a new or rebuilt module. Refer to *Replacing a Module* or *Rebuilding a Module*. **NOTE:** To prevent the migration of adhesive into the air supply, ensure that there is no adhesive on the manifold face when a module is replaced.
4. Adhesive pattern shifting	Module stem sticking (adhesive or debris in piston bore)	Replace the module with a new or rebuilt module. Refer to *Replacing a Module* or *Rebuilding a Module*. **NOTE:** To prevent the migration of adhesive into the air supply, ensure that there is no adhesive on the manifold face when a module is replaced.
	Solenoid valve sticking (solenoid valve used beyond expected life)	Replace the solenoid valve.
	Contaminated air supply (moisture/debris)	Replace the solenoid valve. Ensure that the applicator is being supplied with dry, regulated, unlubricated air. **NOTE:** To prevent this condition, check and/or replace the air regulator filter more frequently.
5. Poor adhesive pattern	Inadequate pattern air flow (adhesive contaminating air supply porting)	Replace the module with a new or rebuilt module. Refer to *Replacing a Module* or *Rebuilding a Module*. **NOTE:** To prevent the migration of adhesive into the air supply, ensure that there is no adhesive on the manifold face when a module is replaced.

Module Problems *(contd)*

Problem	Possible Cause	Corrective Action
6. Module-actuating air leaking	Failed piston seal inside module	Replace the module with a new or rebuilt module. Refer to *Replacing a Module* or *Rebuilding a Module*.
	Failed solenoid valve (solenoid valve used beyond expected life)	Check the solenoid valve and replace if necessary.
	Gasket on solenoid valve block-off plate damaged or installed incorrectly	Inspect the gasket and replace as needed. **NOTE:** To prevent this condition, ensure that gaskets are properly seated and that the block-off plate screws are tightened to the correct torque specification.

Pattern Control Problems

Use this troubleshooting table if you are experiencing adhesive pattern control problems. For additional troubleshooting information, refer to the applicator manual.

NOTE: Some of the problems listed in this troubleshooting table may not apply to the adhesive application you are troubleshooting. Contact your Nordson representative as needed for troubleshooting assistance.

NOTE: To aid in detecting pattern control problems, direct a strobe light on the adhesive as it flows onto the product.

Problem	Possible Cause	Corrective Action
1. Pattern off-center (skewed) or gaps in pattern	Blocked adhesive or air passages in nozzle	Clean or replace the nozzle. Refer to *Nozzle Service.* If cleaning or replacing the nozzle does not improve the pattern, check for blockages in the module, applicator, or hose.
2. End pattern oriented toward center of applicator	Air currents in area near module	Eliminate the air current or add a blank module that provides only pattern air next to the end module.
3. Adhesive droplets thrown from adhesive stream/pattern breaking up (overspray)	Adhesive and/or pattern air temperature too hot	Adjust the temperature settings. Refer to *Applicator Specifications* for temperature recommendations.
	Pattern air pressure too high	Decrease the pattern air pressure.
	Adhesive output rate too low	Increase the system pressure or troubleshoot the output rate problem at the melter. Check for blockages in the nozzle, applicator, or hose.
	Damaged nozzle (adhesive leaking into air passages and being blown into the pattern)	Replace the nozzle. Refer to *Nozzle Service*.
	Applicator too far from product	Adjust the applicator mounting height.
	Adhesive patterns overlapping and interfering with one another	Replace the nozzles on the modules that are producing adhesive streams that interfere with the other module adhesive streams.

Continued...

Pattern Control Problems *(contd)*

Problem	Possible Cause	Corrective Action
4. All patterns too narrow	Adhesive and/or pattern air temperature too cool	Adjust the temperature settings. Refer to *Applicator Specifications* for temperature recommendations.
	Pattern air pressure too low	Increase the pattern air pressure.
	Applicator too close to product	Adjust the applicator mounting height.
	Adhesive flow rate too high	Decrease the system pressure or troubleshoot the output rate problem at the melter.
5. One pattern too narrow	System pressure too high	Reduce the system pressure or clean the nozzles. Refer to *Cleaning Spray Nozzles* or *Cleaning Coating Nozzles*.
	Incorrect or damaged nozzle	Verify that the nozzle part number is correct. Replace damaged nozzles. Refer to *Parts* or *Nozzle Service*.
	Blocked air passage in nozzle	Clean or replace the nozzle. Refer to *Nozzle Service*.
	Blocked air passage in module or heated air manifold	Check for blockage in the pattern air path.
6. All patterns too wide	Adhesive and/or pattern air temperature too hot	Adjust the temperature settings. Refer to *Applicator Specifications* for temperature recommendations.
	Pattern air pressure too high	Decrease the pattern air pressure.
	Applicator too far from product	Adjust the applicator mounting height.
	Adhesive flow rate too low	Increase the system pressure or troubleshoot the output rate problem at the melter.
	Nozzle adhesive opening too large	Change to a nozzle with a smaller adhesive opening. Refer to *Parts*.
7. One pattern too wide	Incorrect or damaged nozzle	Verify that the nozzle part number is correct. Replace damaged nozzles. Refer to *Parts* or *Nozzle Service*.
	Blocked adhesive or air passages in nozzle	Clean or replace the nozzle. Refer to *Nozzle Service*.

Continued...

Problem	Possible Cause	Corrective Action
8. Irregular pattern or adhesive leakage on one module	Nozzle O-ring missing or nozzle too loose (under-tightened) **NOTE:** CF disk nozzles do not have an O-ring.	Install a new nozzle O-ring, replace the nozzle, or tighten the nozzle-retaining clamp screw. Refer to *Nozzle Service*.
9. Adhesive flow not cutting off properly, causing a poor adhesive pattern	Worn or charred module ball and/or seat System pressure too high	Replace the module with a new or rebuilt module. Refer to *Replacing a Module* or *Rebuilding a Module*. Decrease the system pressure.
10. *(Coating applications only)* Coating pattern (film) not uniform, not achieving complete coverage, or showing void areas	System pressure too low Adhesive viscosity too low Blocked adhesive passages in nozzle	Increase the system pressure or ensure that the system pressure is adequate. Increase the adhesive temperature setting. Replace the nozzle with a clean nozzle. Refer to *Nozzle Service*.
11. (*Meltblown applications only)* Individual adhesive streams on a module are wider than other streams	Adhesive and/or pattern air temperature too cool or mounting height out of adjustment Pattern air pressure too low	Adjust the settings to the last good run settings and/or check the applicator mounting height. Increase the pattern air pressure.
12. (*Meltblown applications only)* Fibers too fine, cobwebbing on machine surfaces	Applicator temperature and air pressure settings or mounting height out of adjustment Pattern air pressure too high	Adjust the settings to the last good run settings and/or check the applicator mounting height. Decrease the pattern air pressure.
13. (*Meltblown applications only)* Fibers too coarse, pattern too open	Applicator temperature and air pressure settings or mounting height out of adjustment Pattern air pressure too low	Adjust the settings to the last good run settings and/or check the applicator mounting height. Decrease the pattern air pressure.

Module Service

This section provides module-related service procedures.

Replacing a Module

You will need the following items:

- appropriate tools, including a torque wrench
- drain pans and disposable rags
- replacement module assembly
- replacement O-rings (if needed)
- anti-seize lubricant

NOTE: Refer to *Parts* for the part numbers of parts, tools, and supplies.

Remove the Module

1. Heat the system to application temperature.
2. Relieve system pressure and disable the applicator. Refer to the applicator manual as needed.
3. Trigger the applicator solenoid valves to relieve any remaining pressure.
4. Shut off the module-actuating air.
5. If applicable, decrease the pattern air pressure. Leave just enough air pressure to prevent adhesive from entering the pattern air outlet.
6. See Figure 8. Remove the module mounting screws (1) and then remove the module assembly (including the flange-mounted solenoid valve, if applicable). Discard the O-rings (2, 3).

   NOTE: To replace a flange-mounted solenoid valve, refer to *Rebuilding a Module* later in this section.

   NOTE: To continue operation immediately, refer to the next procedure to install a new or rebuilt module assembly (including solenoid valve, if applicable). The module assembly you just removed can then be tested offline and staged for rebuild if appropriate. Refer to *Module Problems* under *Troubleshooting* to troubleshoot module/solenoid valve operation.

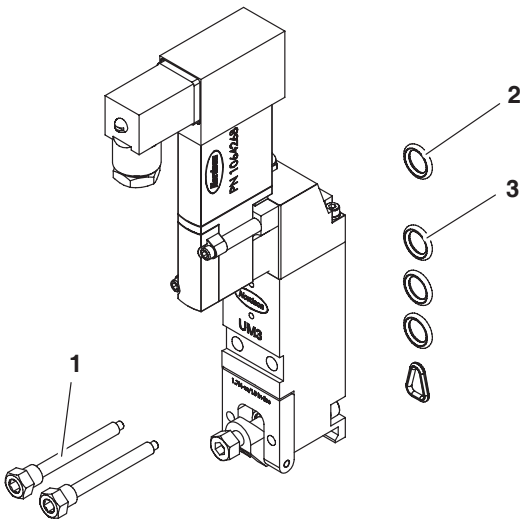


Figure 8 Replacing a module (spray module with flange-mounted solenoid valve shown)

1. Module mounting screws
2. Air cap O-ring
3. Module body O-rings

Install the Module

1. Wipe off any adhesive on the applicator, especially around the air ports, and momentarily turn the module-actuating and pattern air on to blow any residual adhesive out of the ports.

   NOTE: Take care not to wipe adhesive into any ports.

CAUTION: Do not apply O-ring lubricant to the O-rings located between the module and the applicator manifold. Doing so could allow lubricant to migrate into the air passages, negatively affecting module performance.

2. Ensure that the O-rings are properly inserted in the O-ring bores on the back of the replacement module.
3. Coat the module mounting screws with anti-seize lubricant and use them to secure the replacement module assembly to the applicator. Tighten the screws to 3.4 N•m (30 in.-lb).
4. Test the module assembly for correct operation.
5. Restore the system to normal operation. For best results, recheck the torque of the module mounting screws after the applicator reaches application temperature.

Rebuilding a Module

Follow this procedure to rebuild a UM3 module using the module rebuild kit and the rebuild tool kit. If you are rebuilding a high-speed module with a flange-mounted solenoid valve and you want to replace the solenoid valve, you will also need a solenoid valve kit.

NOTE: Refer to *Parts* for the part numbers of all kits, parts, tools, and supplies.

You will need the following items:

- UM3 module rebuild kit
- flange-mounted solenoid valve kit (if applicable)
- rebuild tool kit (see Figure 9)
- 2-mm hex wrench
- 8-mm wrench
- $^1/_4$-in. open-end wrench
- pick set
- pliers
- safety solvent; soaking tank (or bin)
- O-ring lubricant
- Loctite 272
- small flat-blade screw driver (if replacing the solenoid valve)
- anti-seize lubricant (if replacing the solenoid valve)

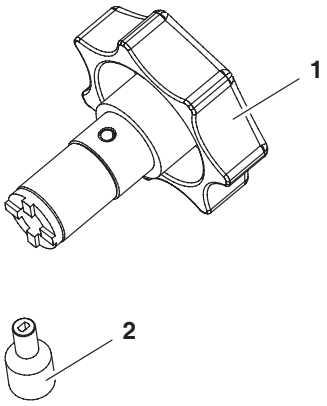


Figure 9 Module rebuild kit tools

1. Cartridge tool
2. Stem wrench tool

Disassemble the Module

NOTE: The illustrations in this section depict a high-speed spray module with a flange-mounted solenoid valve. If you are rebuilding a different type of module, refer to the illustrations under *Parts* as needed.

Remove the module and discard the O-rings

1. To ease module removal, ensure that the applicator is heated at least to the softening point of the adhesive.
2. Relieve system pressure and disable the applicator. Refer to the applicator manual as needed.

WARNING: Molten material! Wear eye or face protection, clothing that protects exposed skin, and heat-protective gloves when servicing equipment that contains molten hot melt. Even when solidified, hot melt can still cause burns. Failure to wear appropriate personal protective equipment can result in personal injury.

3. Remove the nozzle and adapter (if applicable) from the module to be rebuilt. Refer to *Remove the Spray Nozzle* later in this section as needed.
4. See Figure 10. Remove the module from the applicator and remove and discard the module O-rings (2). Refer to *Remove the Module* earlier in this section as needed.

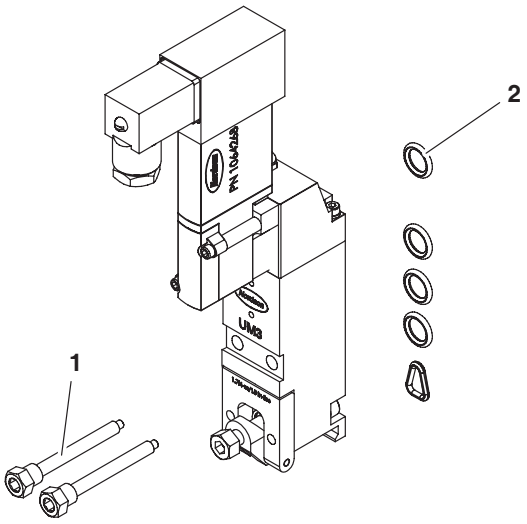


Figure 10 Removing a module

1. Module mounting screws
2. Module O-rings

Disassemble the Module *(contd)*

Remove the air cap and solenoid valve

5. See Figure 11. Using a 2-mm hex wrench, remove the two screws that retain the air cap (2) and (if applicable) the solenoid valve (1).
6. If applicable, disassemble the solenoid valve from the air cap to allow cleaning of the air cap later in this procedure.

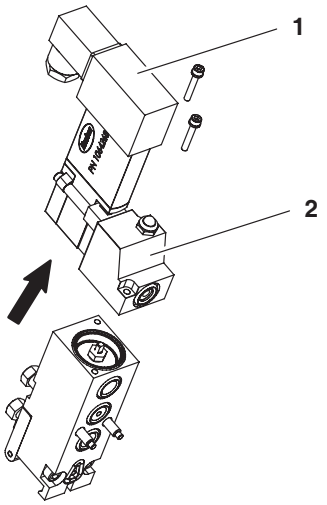


Figure 11 Removing the air cap and solenoid valve

1. Solenoid valve
2. Air cap

Remove the upper module components

See Figure 12.

7. With the module at room-temperature, use a $^1/_4$-in. standard nut driver (1) and $^1/_4$-in. socket (2), remove the 5-40 nut (3) and lock washer (4) that secure the piston seal and washers. Discard the nut and lock washer.

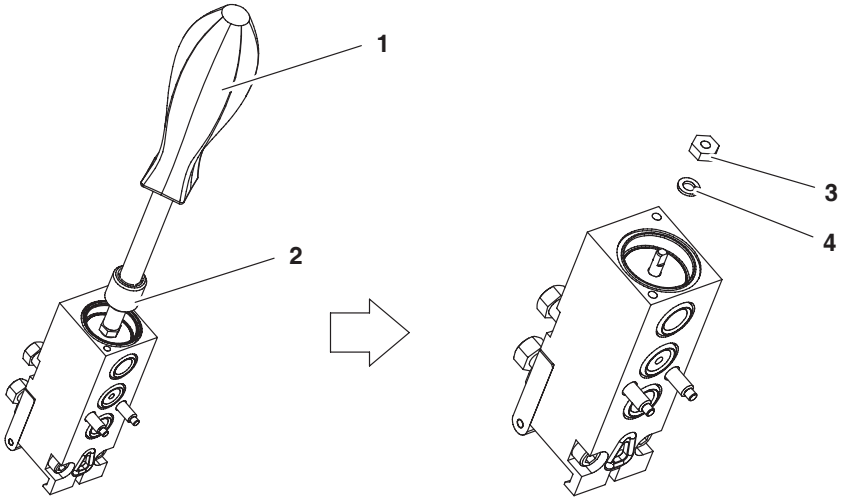


Figure 12 Using the stem wrench tool to remove the 5-40 nut and lock washer

1. Standard $^1/_4$-in. nut driver handle
2. Standard $^1/_4$-in. socket
3. 5-40 nut
4. Lock washer

Disassemble the Module *(contd)*

Remove the upper module components (contd)

See Figure 13.

8. Remove the upper piston washer (1) by turning the module upside down. Discard the upper piston washer.

CAUTION: Risk of equipment damage. Use extreme caution when using the pick tool. It can damage the piston bore if it scratches the surface, causing a lower life expectancy after the rebuild.

9. Using a pick tool, gently puncture the piston seal (2) near the center and use the pick tool to pry it out. Discard the piston seal.
10. Remove and discard the lower piston washer (3) by turning the module upside down. Discard the lower piston washer.
11. Remove the piston spring (4) by turning the module upside down.
12. Remove the air cap O-ring (5) and discard it.

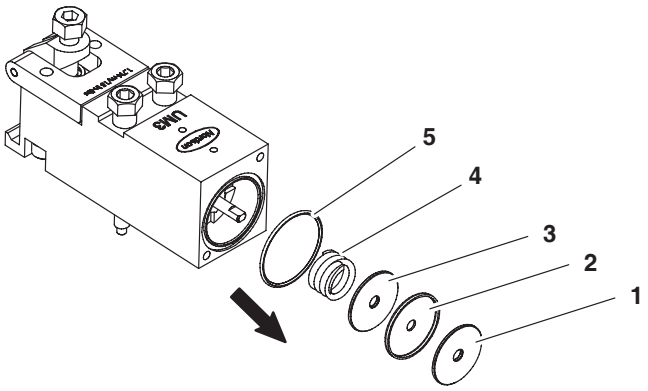


Figure 13 Removing the upper module components

1. Upper piston washer
2. Piston seal
3. Lower piston washer
4. Piston spring
5. Air cap O-ring

Loosen the cartridge assembly

NOTE: Throughout removal of the cartridge assembly, the module temperature must be at the softening point of the adhesive used in the module. If you need to heat the module, use a heat gun or hot plate.

See Figure 14.

13. When the module temperature is at the softening point of the adhesive, insert the cartridge tool (1) in the module piston bore and align the cartridge tool tabs (2) with the grooves in the cartridge assembly.
14. When the cartridge tool is aligned, insert it into the grooves.
15. Using a moderate, constant, downward pressure, turn the cartridge tool counterclockwise until the cartridge assembly is loose.
16. Remove the cartridge tool from the bore.

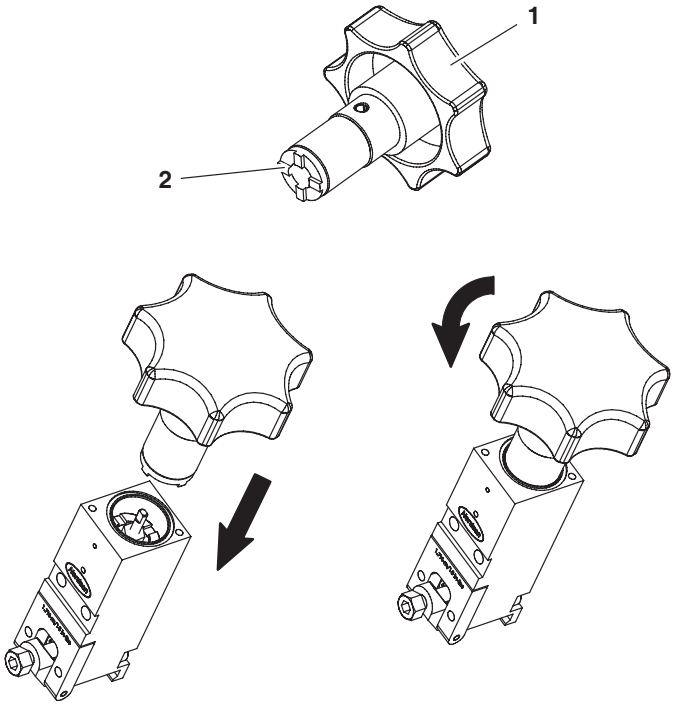


Figure 14 Using the cartridge tool to loosen the cartridge assembly

1. Cartridge tool
2. Cartridge tool tabs

Disassemble the Module *(contd)*

Remove the cartridge assembly

See Figure 15.

17. Ensure that the cartridge tool has completely disengaged the cartridge assembly from the threads inside the module bore.

CAUTION: Do not pull the cartridge assembly from the module bore if it is not completely disengaged. Use the cartridge tool to fully disengage the assembly.

18. Grasp the end of the cartridge assembly with pliers and gently pull the assembly straight out of the module body, taking care to not damage the piston bore.
19. Discard the cartridge assembly.

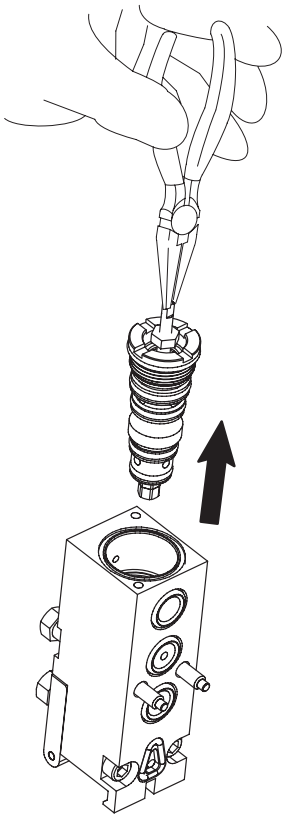


Figure 15 Removing the cartridge assembly

Clean the Module Components

1. Remove and discard any remaining O-rings.
2. Submerge the module body in a safety solvent that is approved for use in your facility.
3. Soak the module body long enough to remove any residual adhesive left inside the cartridge cavity and the adhesive input and recirculation ports.
4. After the adhesive has completely dissolved, blow the parts clean with compressed air. Ensure that the rear port passageways are clear.
5. Wipe any residual solvent away with a soft cloth, taking care to not scratch the internal diameter of the bore with any abrasive substances that may be present.

Reassemble the Module

NOTE: The illustrations in this section depict a high-speed spray module with a flange-mounted solenoid valve. If you are rebuilding a different type of module, refer to the illustrations under *Parts* as needed.

Install the new cartridge assembly

1. See Figure 16. Remove the protective cap (1) from the new cartridge assembly (2).

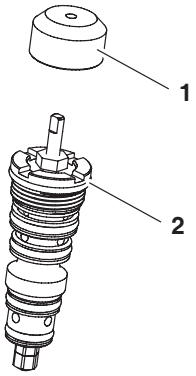


Figure 16 Removing the protective cap from the new cartridge assembly

1. Protective cap
2. Cartridge assembly

Reassemble the Module *(contd)*

Remove the cartridge assembly

2. See Figure 17. Taking care to not create excessive globs of O-ring lubricant, apply a very thin film of lubricant (distributed evenly) to all O-rings in the new cartridge assembly.

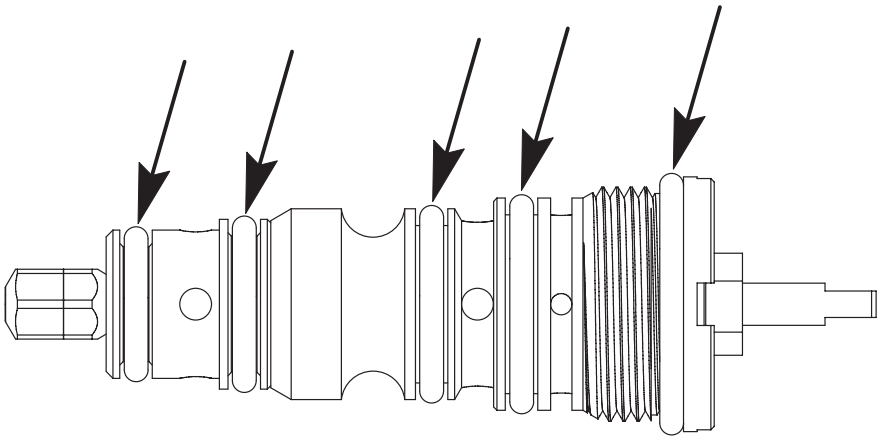


Figure 17 Location of the O-rings on the cartridge assembly

3. See Figure 18. Gently slide (rotating it as you push it in) the new cartridge assembly into the clean module body bore.

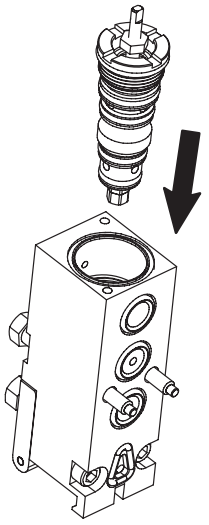


Figure 18 Installing the cartridge assembly

4. Insert the cartridge tool into the bore, aligning the cartridge tool tabs with the grooves in the cartridge assembly.
5. See Figure 19. Using a moderate, constant, downward pressure, turn the cartridge tool clockwise until it is hand-tight. To prevent thread damage, do not force the threads to engage.
6. Remove the cartridge tool from the bore.

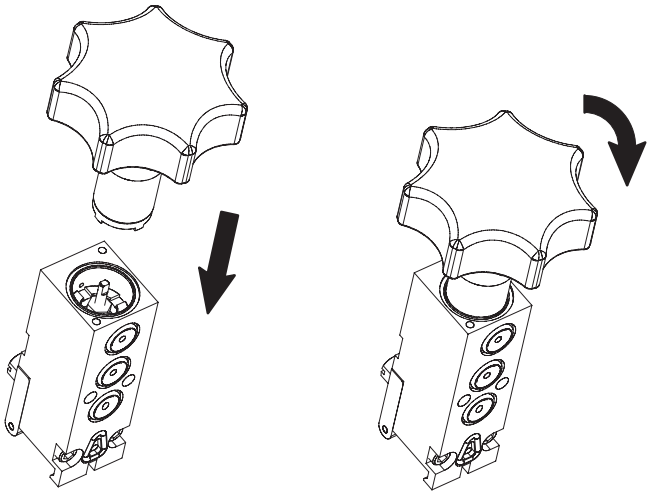


Figure 19 Using the cartridge tool to tighten the cartridge assembly

Reassemble the Module *(contd)*

Install the new air cap O-ring and piston spring

7. See Figure 20. Insert a new piston spring (1) in the bore in the cartridge assembly.

CAUTION: Do not apply O-ring lubricant to any O-rings associated with the air cap. Doing so could allow lubricant to migrate into the air passages, negatively affecting module performance.

8. Place a new air cap O-ring (2) in the groove in the top of the module body.

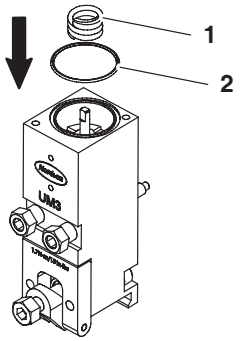


Figure 20 Installing a new piston spring and air cap O-ring

1. Piston spring
2. Air cap O-ring

Install the piston washers/seal and the nut/lock washer

9. See Figure 21. Insert the piston washers and seal into the bore.

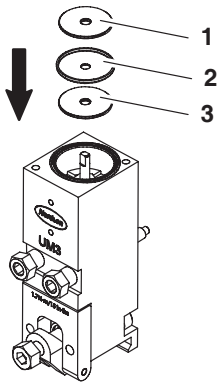


Figure 21 Installing the piston washers and seal

1. Upper piston washer
2. Piston seal
3. Lower piston washer

10. See Figure 22. Install the lock washer (2).
11. Apply one drop of Loctite 272 to the top of the stem and thread the 5-40 nut (1) onto the stem by hand.
12. Using a $^1/_4$-in. standard nut driver (3) with a standard $^1/_4$-in. socket (4), press down on the 5-40 nut, pushing the piston seal into its bore. While holding the downward pressure, turn the nut driver clockwise until the 5-40 nut is snug against the upper piston washer.

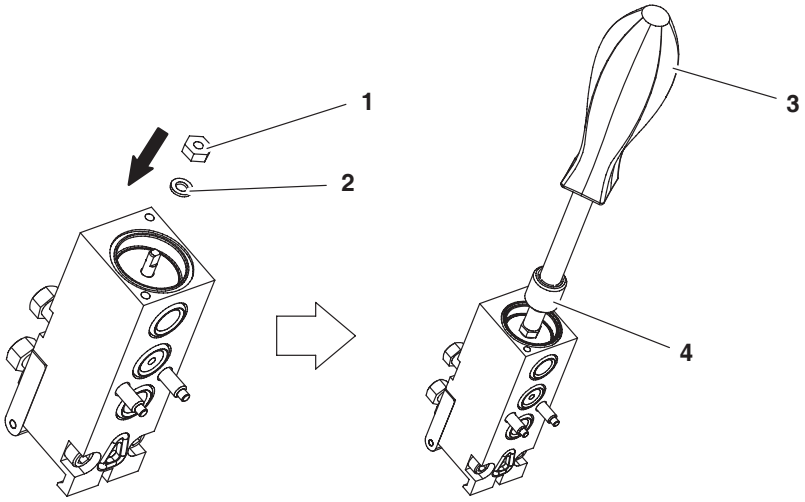


Figure 22 Using the stem wrench tool to remove the 5-40 nut and lock washer

1. 5-40 nut
2. Lock washer
3. Standard $^1/_4$-in. nut driver handle
4. Standard $^1/_4$-in. socket

Reassemble the Module *(contd)*

Install the piston washers/seal and the nut/lock washer (contd)

13. See Figure 23. When the 5-40 nut is snug, use the stem wrench tool in combination with a standard $^1/_4$-in. open-end wrench to fully tighten the 5-40 nut and properly compress the piston washers against the piston seal. Tighten the 5-40 nut to approximately 2.3–2.8 N•m (20–25 in.-lb).

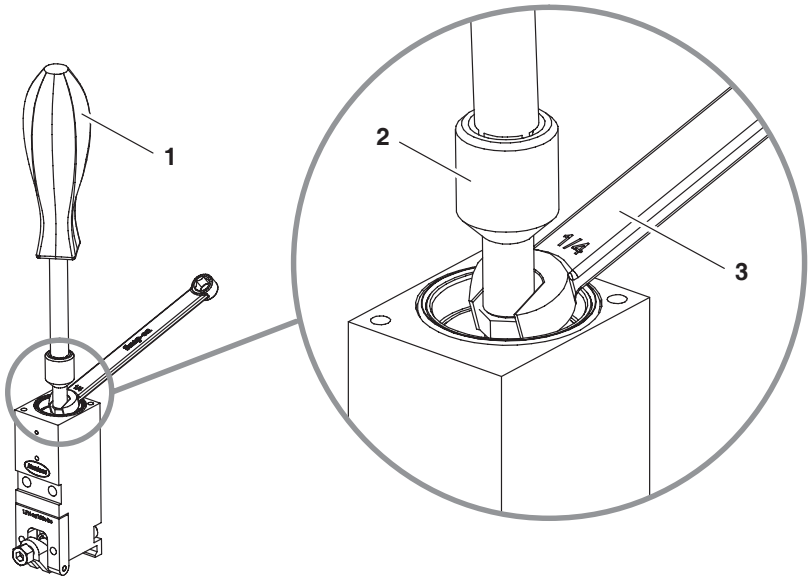


Figure 23 Using the stem wrench tool and an open-end wrench to tighten the 5-40 nut

1. Standard $^1/_4$-in. nut driver handle
2. Stem wrench tool
3. Open-end wrench

Reinstall the air cap

See Figure 24.

14. Insert the air cap assembly (2) in the module body bore.

    NOTE: The rebuild kit includes new air cap parts for high-speed modules only. If you are rebuilding a standard module, reinstall the existing air cap assembly.

15. Align the front surface of the air cap so that it is parallel to the front surface of the module body.
16. Apply anti-seize lubricant to the air cap screws (1).
17. Using a 2-mm hex wrench, install the air cap and solenoid valve (if applicable) assembly and tighten the two air cap screws to 1.02–1.13 N•m (9–10 in.-lb).

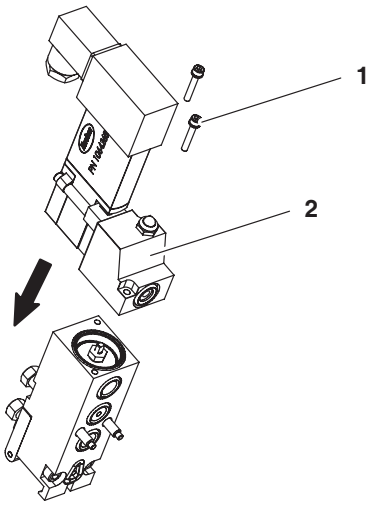


Figure 24 Installing the air cap

1. Air cap screws
2. Air cap

Reassemble the Module *(contd)*

Install the solenoid valve (if applicable)

CAUTION: Do not apply O-ring lubricant to any O-rings associated with the air cap. Doing so could allow lubricant to migrate into the air passages, negatively affecting module performance.

See Figure 25.

18. If you are rebuilding a high-speed module with a flange-mounted solenoid valve, install new O-rings (3) on the air cap.
19. Apply anti-seize lubricant to the threads of the two 2.5-mm solenoid valve machine screws and use them to install a new or existing solenoid valve (1) and heat isolator (2).

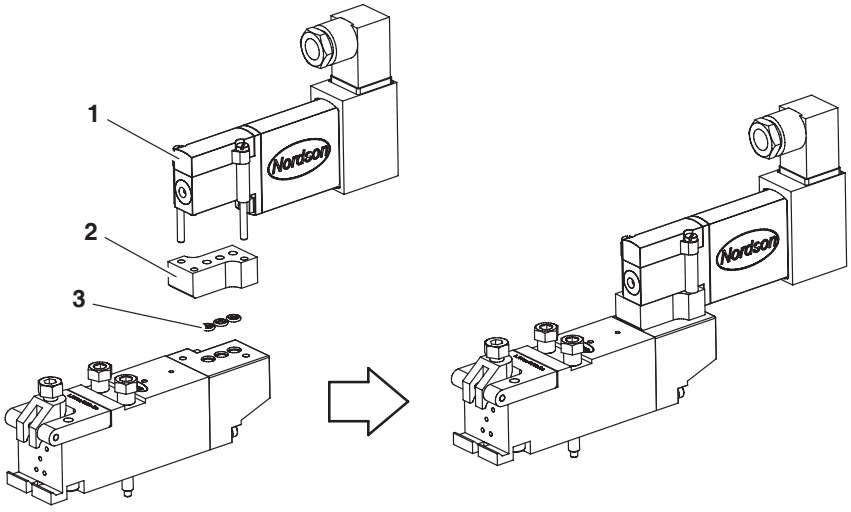


Figure 25 Installing a solenoid valve and heat isolator

1. Solenoid valve
2. Heat isolator
3. Air cap O-rings

Install new O-rings and silencer

CAUTION: Do not apply O-ring lubricant to the O-rings located between the module and the applicator manifold. Doing so could allow lubricant to migrate into the air passages, negatively affecting module performance.

20. See Figure 26. Insert new O-rings in the grooves on the module body and cap.

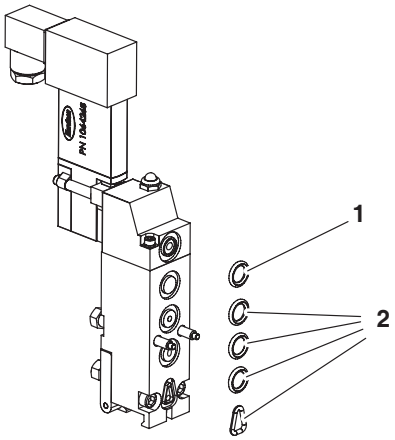


Figure 26 Installing new O-rings

1. Air cap O-ring
2. Module body O-rings

21. See Figure 27. If applicable, use an 8-mm wrench to remove the existing solenoid valve silencer.
22. Install a new silencer.

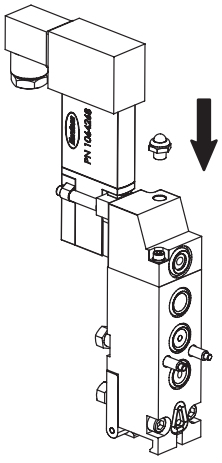


Figure 27 Installing a silencer

Reassemble the Module *(contd)*

Reinstall the module

23. Reinstall the module on the applicator.
24. Reinstall the adapter and nozzle (if applicable).
25. Restore the system to normal operation.

Nozzle Service

This section provides nozzle-related service procedures.

Removing/Installing a Spray Nozzle

Several types of nozzle may be installed on a UM3 spray module. In some cases, the nozzle is installed on an adapter. Follow this procedure to remove or install nozzles and/or adapters as needed. You will need the following items:

- appropriate tools, including a torque wrench
- drain pans and disposable rags
- replacement adapter and/or nozzle, if applicable

NOTE: Refer to *Parts* for the part numbers of parts, tools, and supplies.

Remove the Spray Nozzle

1. Heat the system to application temperature.
2. Relieve system pressure and disable the applicator. Refer to the applicator manual as needed.
3. Trigger the applicator solenoid valves to relieve any remaining pressure.
4. Shut off the module-actuating air.
5. Decrease the pattern air pressure. Leave just enough air pressure to prevent adhesive from entering the pattern air outlet on the module.

6. **To remove a CF disk or unibody nozzle:**

   NOTE: A CF disk nozzle is two-piece nozzle that consists of a nozzle disk and a retaining nut. A CF unibody nozzle is a one-piece nozzle.

   See Figure 28.

   a. Use a wrench to loosen the nozzle-retaining nut.

      NOTE: Do not use a torque wrench to loosen or remove a nozzle. Doing so will cause the torque wrench to become uncalibrated.

   b. Remove the nozzle by hand.

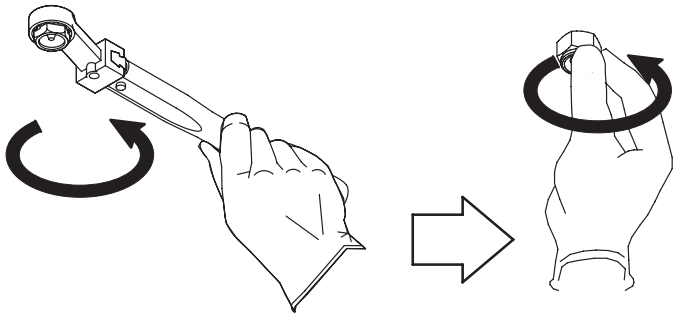


Figure 28 Removing a CF disk or unibody nozzle

Remove the Spray Nozzle *(contd)*

7. **To remove an adapter or Universal CF, meltblown, Summit, or SureWrap nozzle:**

   See Figure 29.

   a. Back the nozzle-retaining clamp screw all the way out until it stops.

   b. Push the nozzle-retaining clamp toward the module to eject the adapter or nozzle.

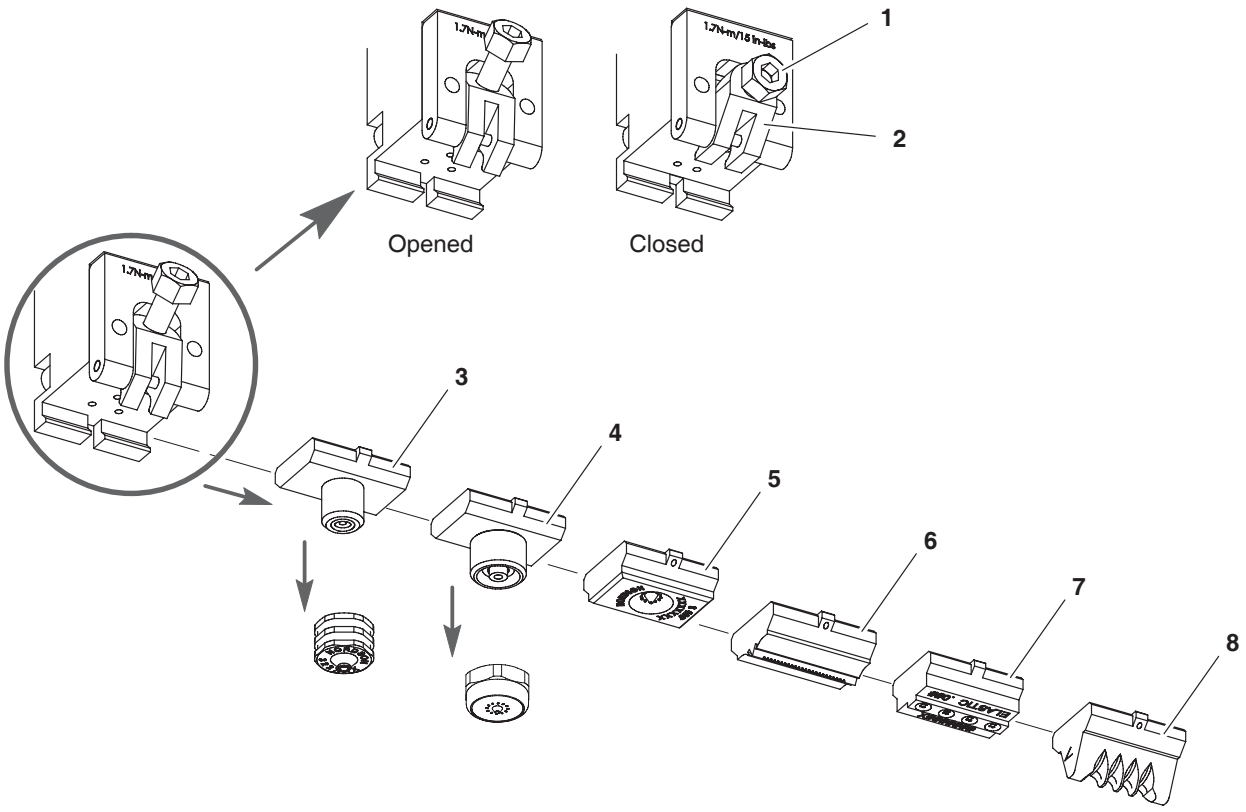


Figure 29 Adapter or nozzle removal or installation

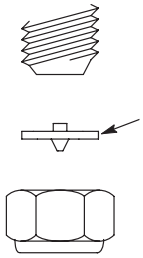
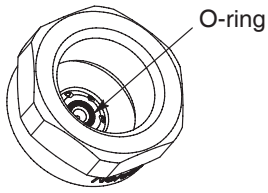
1. Nozzle-retaining clamp screw
2. Nozzle-retaining clamp
3. Bead adapter and bead nozzle
4. CF adapter and CF disk or unibody nozzle
5. Universal CF nozzle
6. Meltblown nozzle
7. Summit nozzle
8. SureWrap nozzle

Note: Refer to the steps that begin *To remove a CF disk or unibody nozzle* or *To install a CF disk or unibody nozzle* for CF disk and unibody nozzle removal/installation instructions.

Install the Spray Nozzle

1. Clean the mating surface where the adapter or nozzle will be seated.

2. **To install a CF disk or unibody nozzle:**

Type of Nozzle	Removal Procedure
Disk nozzle 	a. Orient the nozzle disk as shown at left and place the disk inside the nozzle-retaining nut; then hand-thread the nut onto the module. b. Use a wrench to tighten the nut to no more than 3.4 N•m (30 in.-lb).
Unibody nozzle 	a. Inspect the nozzle O-ring, replace if necessary, and ensure that the O-ring is lubricated and properly positioned. b. Hand-thread the nozzle onto the module. Use a wrench to tighten the nozzle to no more than 0.6 N•m (5 in.-lb).

NOTE: Nordson offers special torque wrenches for CF disk and unibody nozzles. Refer to *Recommended Spare Parts and Supplies* under *Parts*.

3. **To install an adapter or Universal CF, meltblown, Summit, or SureWrap nozzle:**

   See Figure 29.

   a. Inspect the adapter or nozzle O-ring, replace if necessary, and ensure that the O-ring is lubricated and properly positioned in the O-ring bore.

   b. Carefully insert the adapter or nozzle in the module seat.

CAUTION: Overtightening a nozzle-retaining clamp screw can damage the module.

   c. Tighten the nozzle-retaining clamp screw to 1.7 N•m (15 in.-lb).

Removing/Installing a Coating Nozzle

A coating nozzle is an assembly that may be installed on a single module or on multiple modules. Each coating nozzle is custom-made, so your nozzle may be different from the nozzle shown in this procedure. Regardless of the nozzle configuration, the procedure for removing or installing a coating nozzle is the same. You will need the following items:

- appropriate tools, including a torque wrench
- drain pans and disposable rags
- replacement coating nozzle assembly (new or cleaned)

NOTE: Refer to *Parts* for the part numbers of parts, tools, and supplies.

Remove the Coating Nozzle

1. Heat the system to application temperature.
2. Relieve system pressure and disable the applicator. Refer to the applicator manual as needed.
3. Trigger the applicator solenoid valves to relieve any remaining pressure.
4. Shut off the module-actuating air.

See Figure 30.

5. While holding the nozzle assembly (3), remove all the M4 mounting screws that secure the assembly to the module (4) and then remove the nozzle assembly.

Install the Coating Nozzle

See Figure 30.

1. Ensure that the O-rings (2) on the top of the nozzle are present before proceeding.
2. Holding the nozzle assembly (3) close to the module (1), insert one of the M4 mounting screws (4), align it to the correct module mounting hole, and thread it into the bottom of the module.
3. Tighten the mounting screw to 2.8–3.4 N•m (25–30 in.-lb).
4. Repeat steps 2–3 for all the mounting screws of the nozzle being installed.
5. Restore the system to normal operation.

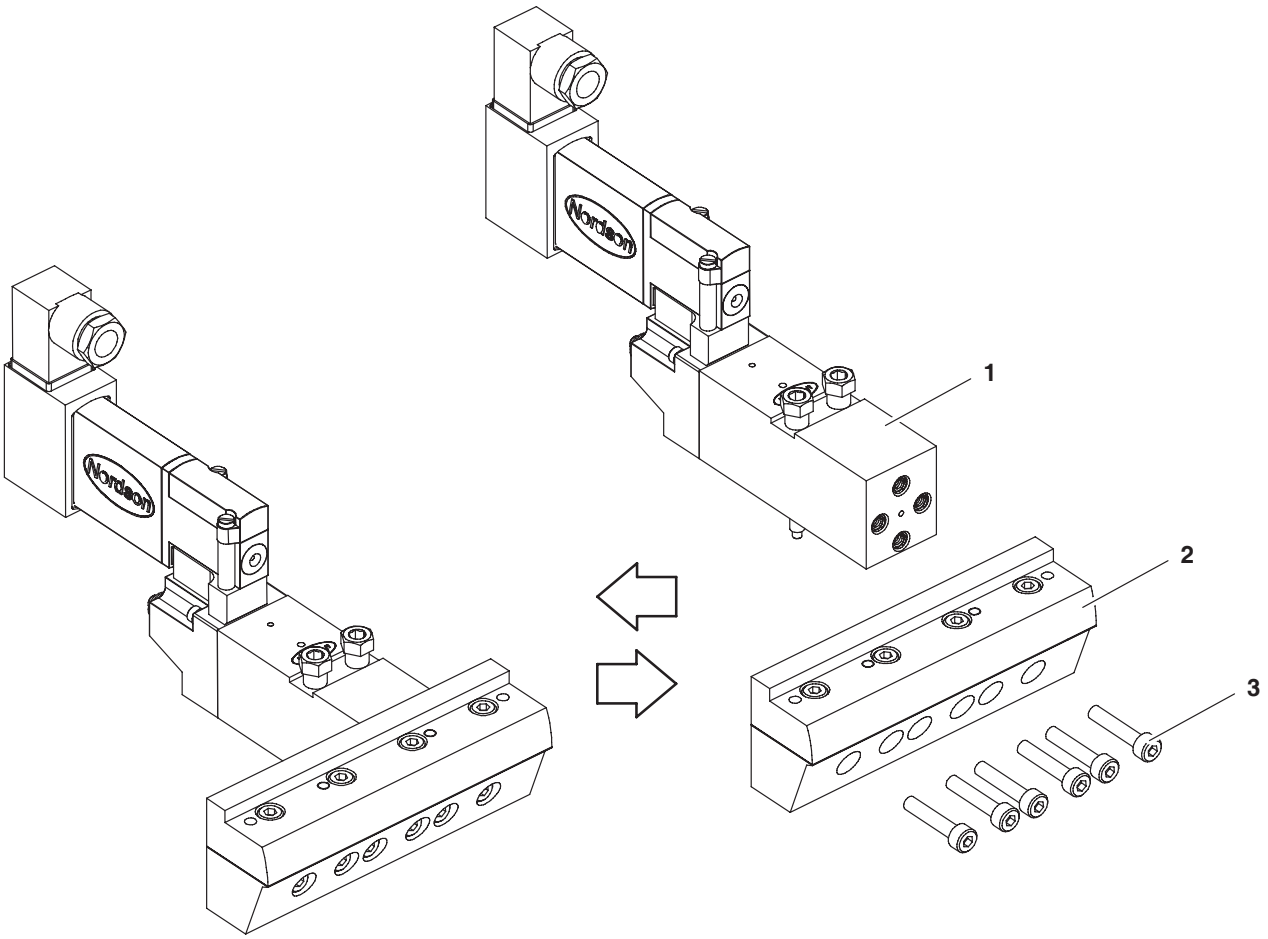


Figure 30 Removing or installing a coating nozzle (typical nozzle shown)

1. UM3 coating module
2. Coating nozzle assembly
3. Mounting screws

Cleaning Spray Nozzles

Spray nozzles should be cleaned weekly or as needed to prevent clogging. You will need the following items:

- appropriate tools, including a torque wrench
- nozzle cleaning kits
- cleaning supplies (refer to Table 3)
- drain pans and disposable rags
- O-ring lubricant

NOTE: Refer to *Parts* for the part numbers of parts, tools, and supplies.

1. Remove the nozzles. Refer to *Removing/Installing a Spray Nozzle* earlier in this section.
2. Clean the nozzles using one of the Nordson-recommended methods shown in Table 3. Use only cleaning agents recommended by the adhesive supplier.

WARNING: Risk of explosion or fire. Follow the safety guidance and heating recommendations on the Material Safety Data Sheets (MSDSs) for your adhesives and nozzle-cleaning solutions.

WARNING: Risk of explosion or fire. Use a controlled heating device, such as a thermostatically controlled hot plate, to heat cleaning fluid, including Nordson Type-R fluid.

CAUTION: Risk of equipment damage. Do not use a wire brush (or a brush with bristles harder than the nozzle) to clean nozzles.

Table 3 Nozzle Cleaning Methods

Cleaning Method	Procedure
Citrus-based solution and ultrasonic tank **NOTE:** This is the most thorough method.	a. Place the nozzles in citrus-based solvent/degreasing solution and soak them overnight or for approximately 4 hours. This dissolves and loosens the adhesive and char buildup. b. Remove the nozzles from the citrus-based solvent/degreasing solution and place them in an alkaline solution heated to the appropriate temperature (refer to the MSDS) in an ultrasonic tank. Soak the nozzles for approximately 10 minutes. This will remove adhesive and char from the orifices. c. Scrub the nozzles with a soft, non-metallic brush to remove debris. d. Gently blow air through the nozzle orifices from the mounting side of the nozzle.
Nordson Type-R fluid	a. Place the nozzles in a controlled heating device containing Nordson Type-R fluid and heat it above the melting point of the adhesive (refer to the MSDS). b. Scrub the nozzles with a soft, non-metallic brush to remove debris.
Electric heat gun	a. Heat the nozzles with a flameless electric heat gun. b. Scrub the nozzles with a soft, non-metallic brush to remove debris.
Ultrasonic tank	a. Place the nozzles in an alkaline solution heated to the appropriate temperature (refer to the MSDS) in an ultrasonic tank. Soak the nozzles for approximately 10 minutes. b. Scrub the nozzles with a soft, non-metallic brush to remove debris. c. Gently blow air through the nozzle orifices from the mounting side of the nozzle.

Continued...

Cleaning Spray Nozzles *(contd)*

Table 3 Nozzle Cleaning Methods *(contd)*

Cleaning Method	Procedure
Oven **NOTE:** This method will cause discoloration of unplated brass nozzles. This discoloration is cosmetic only and will not adversely affect nozzle performance. **NOTE:** This method is not recommended for color-coded nozzles (such as Saturn and CF steel unibody nozzles) because it will remove the color from the nozzles.	**WARNING**: Risk of explosion, fire, or toxic vapor release. Depending on the type of adhesive and/or organic solvent used with the nozzles, heating them in an oven can cause a hazardous event. Before using an oven to clean nozzles, consult with the oven manufacturer about the viability of this method and the safety risks. Follow the manufacturer's recommendations. **WARNING**: Use the oven heating controls to keep the oven at the desired temperature. Do not use an oven that does not have heating controls. **WARNING**: The heating temperature and time may need to be adjusted based on the oven type, the adhesive type, and the amount of char buildup on the nozzles. Nordson Corporation recommends testing this procedure on discarded nozzles prior to using it on good nozzles. **CAUTION:** Risk of equipment damage. Remove O-rings before cleaning nozzles in an oven. Failure to do so can cause a chemical reaction that will permanently damage the nozzles. a. Ensuring that O-rings have been removed from the nozzles, place them in an electric oven heated to approximately 385 °C (725 °F). Allow the nozzles to bake for approximately 3–4 hours. b. Turn off the oven and allow the nozzles to cool; then remove the nozzles. **WARNING**: Risk of fire. Use a heat-proof cloth to clean nozzles. Even cotton can burn in high-temperature conditions. **WARNING**: Risk of equipment damage. Handle nozzles carefully to avoid denting the orifices, which can degrade the adhesive pattern. c. Wipe the nozzles with a soft cloth and then gently blow air through the nozzle orifices from the mounting side of the nozzle.

3. If there is any remaining char buildup on the nozzles, gently scrape the char from the nozzles.

CAUTION: Risk of equipment damage. Use of an open torch, drill, or broach can damage a nozzle. Use only a pin-type probe to clean nozzle orifices and do not twist the probe inside the nozzle.

4. If cleaning of the orifices of a spray nozzle is necessary, use a pin-type probe that is one size smaller than the orifice size: insert the probe in the direction opposite the adhesive flow and then remove the probe without twisting it, as shown in Figure 31.

   NOTE: Nordson offers two nozzle cleaning kits that contain a holder and several probe sizes. Refer to *Recommended Spare Parts and Supplies* under *Parts*.

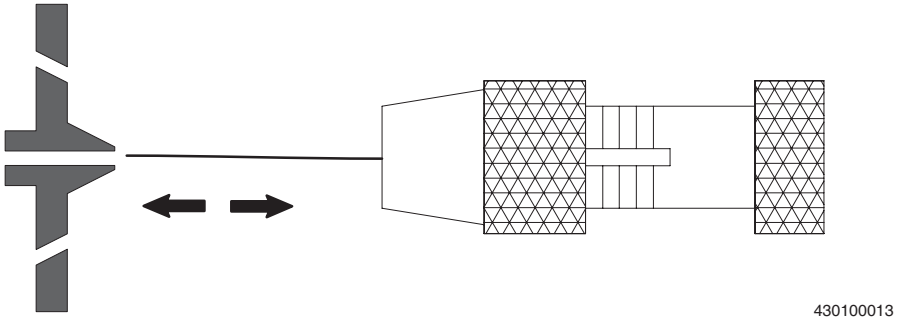


Figure 31 Correct direction to insert a pin-type probe into a spray nozzle (CF nozzle disk shown)

5. Reinstall the nozzles. Refer to *Removing/Installing a Spray Nozzle* earlier in this section.
6. Restore the system to normal operation.

Cleaning Coating Nozzles

Coating nozzles should be cleaned weekly or as needed to prevent clogging. You will need the following items:

- appropriate tools, including a torque wrench
- approved cleaning solvents
- drain pans and disposable rags

NOTE: Refer to *Parts* for the part numbers of parts, tools, and supplies.

Remove and Disassemble the Coating Nozzle

1. Remove the coating nozzle assembly. Refer to *Removing/Installing a Coating Nozzle* earlier in this section.

See Figure 32.

2. On back side of the rear mouthpiece (3), use a hammer and a drive-pin punch to drive out the dowel pins (5).
3. Use a 3-mm hex wrench to remove all the M4 screws (4).

CAUTION: Take care not to sratch or damage the interior surfaces of the mouthpieces. Char can build up in scratches or surface imperfections, causing leakage, seal degradation, and/or the need for more frequent cleaning.

4. Reinstall two of the screws (4) into the two threaded holes on each end of the front mouthpiece (1). Tighten these screws evenly until the two halves of the nozzle assembly begin to separate. These screws will bottom out against the inside face of the rear mouthpiece (3) and will help pull the halves apart if adhesive is inside.

Clean the Coating Nozzle

1. Use approved solvents to clean items 1, 2 and 3.
2. After adhesive has been dissolved completely, wipe the parts thoroughly with a clean cloth to remove all adhesive residue.

Assemble the Coating Nozzle

See Figure 32.

1. Press the dowel pins (5) into the rear mouthpiece (3).
2. Slide the appropriate shim plate (for your application) over the dowel pins for alignment.

CAUTION: Take care not to sratch or damage the interior surfaces of the mouthpieces. Char can build up in scratches or surface imperfections, causing leakage, seal degradation, and/or the need for more frequent cleaning.

3. Slide the front mouthpiece (1) over the dowel pins to align the mouthpiece halves to one another.
4. When the mouthpiece halves are together, reinstall the screws (4) and tighten them to 2.8–3.4 N•m (25–30 in.-lb).
5. Install new O-rings (6).
6. Reinstall the coating nozzle assembly on the module. Refer to *Removing/Installing a Coating Nozzle* earlier in this section.
7. Restore the system to normal operation.

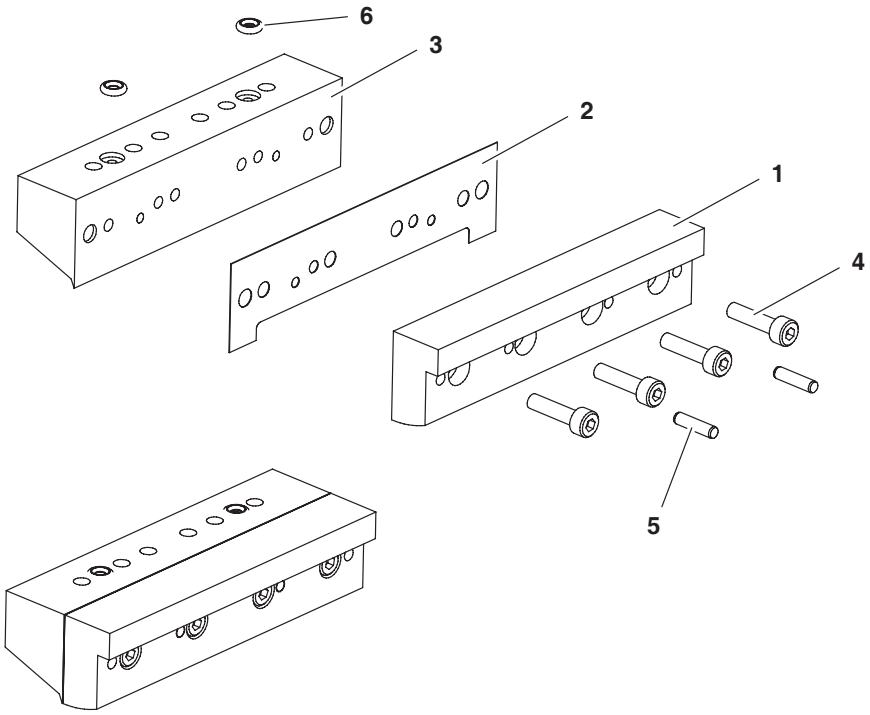


Figure 32 Coating nozzle components

1. Front mouthpiece
2. Shim
3. Rear mouthpiece
4. Screw (M4 x 16)
5. Dowel pin
6. O-ring

This page intentionally left blank.

Parts

To order parts, call the Nordson Customer Service Center or your local Nordson representative. Use these five-column parts lists, and the accompanying illustrations, to describe and locate parts correctly. The following chart provides guidance for reading the parts lists.

The number in the *Item* column corresponds to the circled item number in the parts list illustration. A dash in this column indicates that the item is an assembly.

The number in the *Part* column is the Nordson part number you can use to order the part. A series of dashes indicates that the part is not saleable. In this case, you must order either the assembly in which the part is used or a service kit that includes the part.

The *Description* column describes the part and sometimes includes dimensions or specifications.

The *Note* column contains letters that refer to notes at the bottom of the parts list. These notes provide important information about the part.

The *Quantity* column tells you how many of the part is used to manufacture the assembly shown in the parts list illustration. A dash or AR in this column indicates that the amount of the item required in the assembly is not quantifiable.

Item	Part	Description	Quantity	Note
—	0000000	Assembly A	—	
1	000000	• Part of assembly A	2	A
2	- - - - - -	• • Part of item 1	1	
3	0000000	• • • Part of item 2	AR	
NS	000000	• • • • Part of item 3	2	

NOTE A: Important information about item 1

AR: As Required

NS: Not Shown

UM3 Module Parts

There are several types of UM3 module. Be sure to refer to the parts lists that apply to your modules. Table 2 at the beginning of this section provides an overview of the modules.

High-Speed Spray Modules

See Figure 33.

Item	Part	Description	Quantity	Note
—	1057602	Module, spray, UM3, without solenoid valve	—	
—	1050136	Module, spray, UM3, with flange-mounted solenoid valve (FMS)	—	
1	- - - - - -	• Body, 3-way	1	
2	- - - - - -	• Assembly, cartridge	1	A
3	1048702	• Assembly, clamp, nozzle-retaining, standard	1	
4	1050180	• Screw, mounting, M4	2	
5	940111	• O-ring, Viton, 0.301 ID x 0.070 W in.	5	
6	1057823	• Assembly, air cap, FMS	1	
6	253890	• • O-ring, 3 x 1 mm	3	
7	- - - - - -	• Nut, hex, 5-40, small pattern	1	A
8	- - - - - -	• Spring, piston	1	A
9	- - - - - -	• Washer, piston	2	A
10	- - - - - -	• Seal, piston	1	A
11	- - - - - -	• Washer, lock, split, #5	1	A
12	1039719	• O-ring, Viton, 0.811 ID x 0.036 W in.	1	A
13	1019256	• Compound, anti-seize lubricant	AR	
14	900223	• Lubricant, O-ring, Parker, 4 oz	AR	
15	900470	• Adhesive, Loctite 272, Red, high-temperature, 50 ml	AR	
—	1064679	Assembly, solenoid valve, 24V, high-temperature, fast-switch	1	B
16	1064268	• Solenoid, flange-mounted, high-temperature, 24V	1	B
17	1054167	• Isolator, UM3 solenoid heat	1	B

NOTE A: These parts are available in the module rebuild kit. Refer to *Module Service Kits* later in this section.

B: These parts are present only on module part number 1050136.

AR: As Required

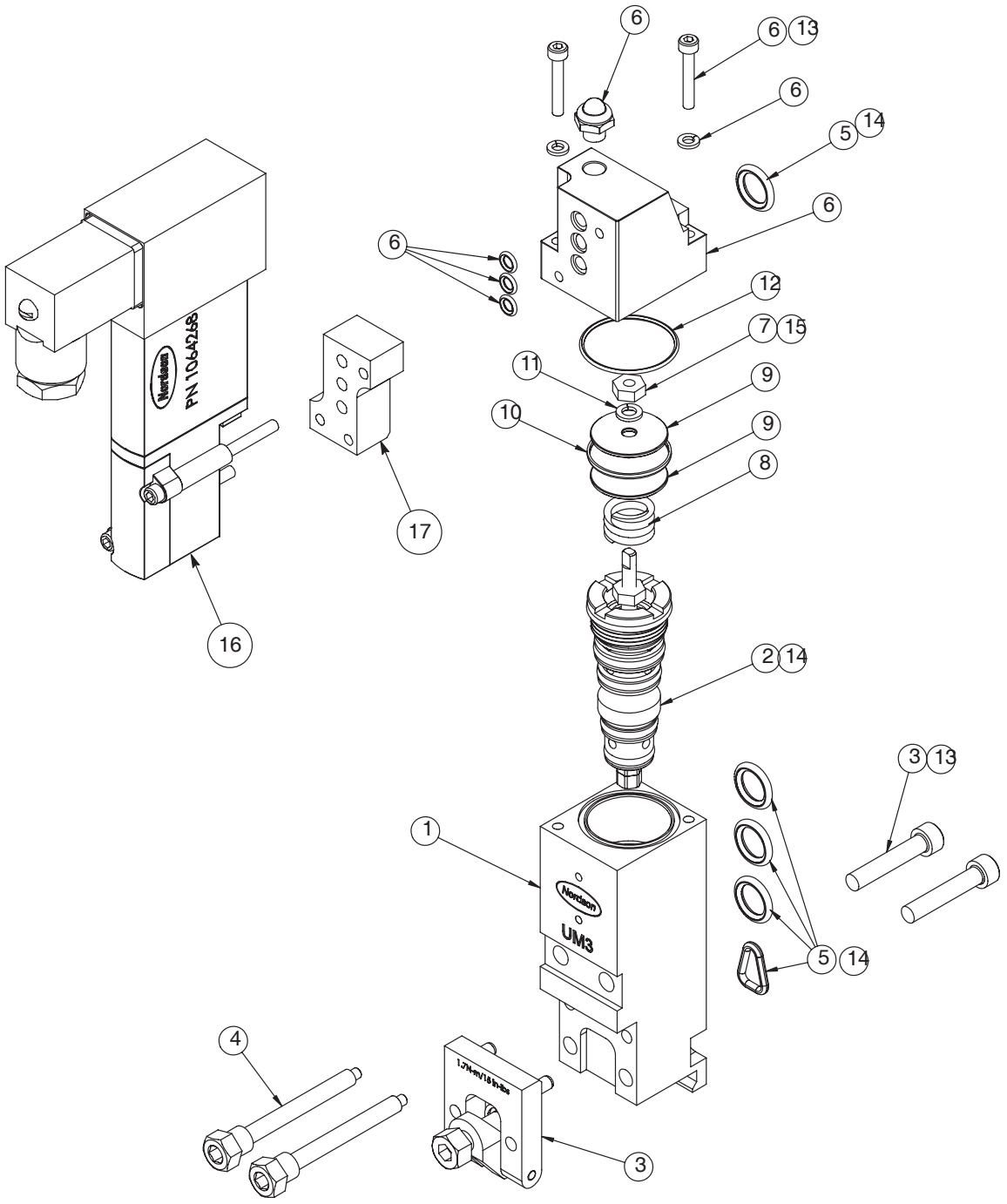


Figure 33 High-speed spray module parts

Standard Spray Modules

See Figure 34. These modules are used with manifold-mounted solenoid valves (MMS).

Item	Part	Description	Quantity	Note
—	1057923	Module, spray, UM3, standard	—	
—	1064076	Module, spray, UM3, standard, stainless-steel	—	
1	- - - - - -	• Body, 3-way	1	
2	- - - - - -	• Assembly, cartridge	1	A
3	1048702	• Assembly, clamp, nozzle-retaining, standard	1	
4	1050180	• Screw, mounting, M4	2	
5	940111	• O-ring, Viton, 0.301 ID x 0.070 W in.	5	
6	1057932	• Assembly, air cap, MMS	1	
	1061797	• Assembly, air cap, MMS, stainless-steel	1	
7	- - - - - -	• Nut, hex, 5-40, small pattern	1	A
8	- - - - - -	• Spring, piston	1	A
9	- - - - - -	• Washer, piston	2	A
10	- - - - - -	• Seal, piston	1	A
11	- - - - - -	• Washer, lock, split, #5	1	A
12	1039719	• O-ring, Viton, 0.811 ID x 0.036 W in.	1	
13	1019256	• Compound, anti-seize lubricant	AR	
14	900223	• Lubricant, O-ring, Parker, 4 oz	AR	

NOTE A: These parts are available in the module rebuild kit. Refer to *Module Service Kits* later in this section.

AR: As Required

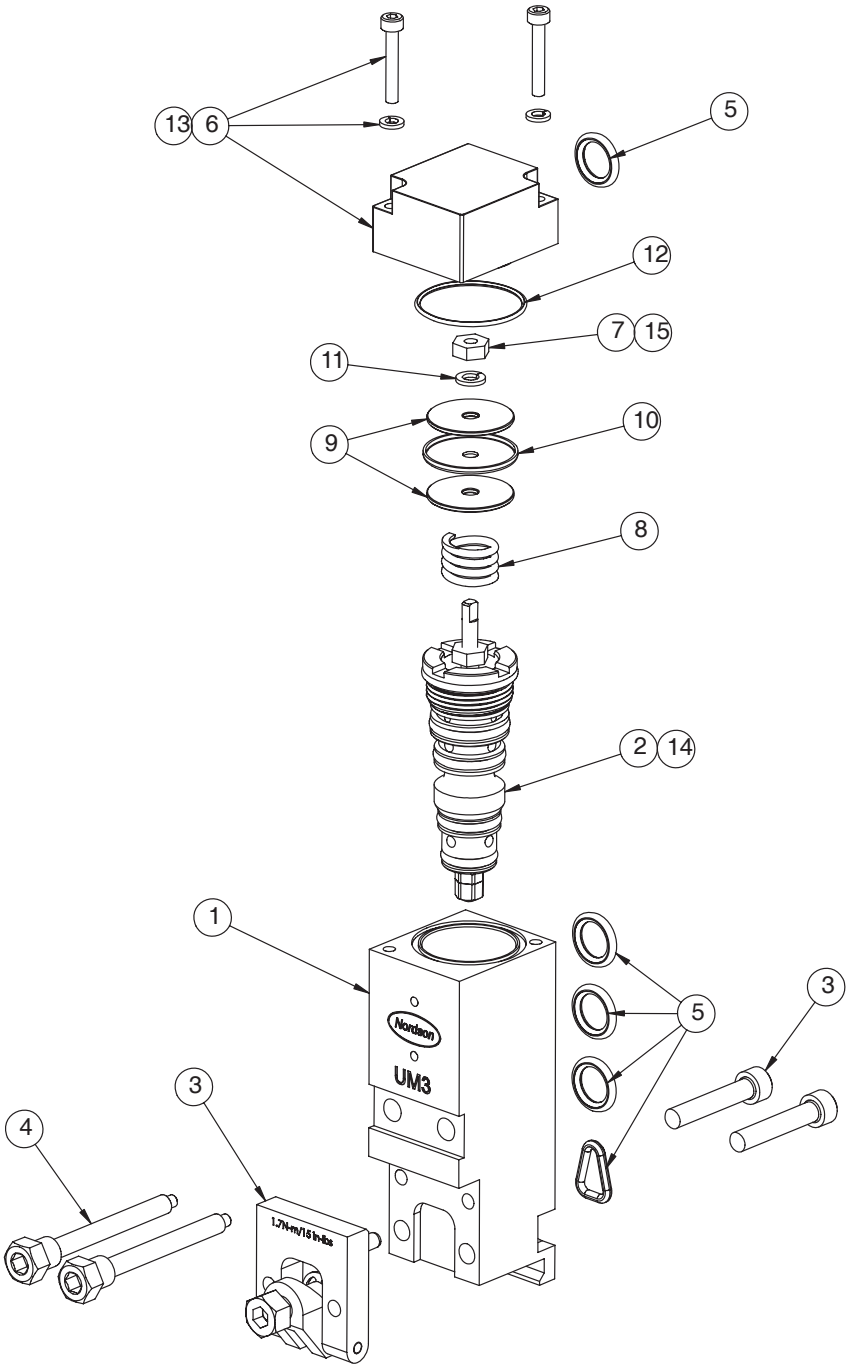


Figure 34 Standard spray module parts

Right-Angle Standard Spray Modules

See Figure 35. These modules are used with manifold-mounted solenoid valves (MMS).

Item	Part	Description	Quantity	Note
—	1063237	Module, spray, UM3, standard, right-angle	—	
—	1064280	Module, spray, UM3, standard, right-angle, stainless-steel	—	
1	- - - - - -	• Body, 3-way	1	
2	- - - - - -	• Assembly, cartridge	1	A
3	1048702	• Assembly, clamp, nozzle-retaining, standard	1	
4	1050180	• Screw, mounting, M4	2	
5	940111	• O-ring, Viton, 0.301 ID x 0.070 W in.	5	
6	1057932	• Assembly, air cap, MMS	1	
	1061797	• Assembly, air cap, MMS, stainless-steel	1	
7	- - - - - -	• Nut, hex, 5-40, small pattern	1	A
8	- - - - - -	• Spring, piston	1	A
9	- - - - - -	• Washer, piston	2	A
10	- - - - - -	• Seal, piston	1	A
11	- - - - - -	• Washer, lock, split, #5	1	A
12	1039719	• O-ring, Viton, 0.811 ID x 0.036 W in.	1	
13	1019256	• Compound, anti-seize lubricant	AR	
14	900223	• Lubricant, O-ring, Parker, 4 oz	AR	

NOTE A: These parts are available in the module rebuild kit. Refer to *Module Service Kits* later in this section.

AR: As Required

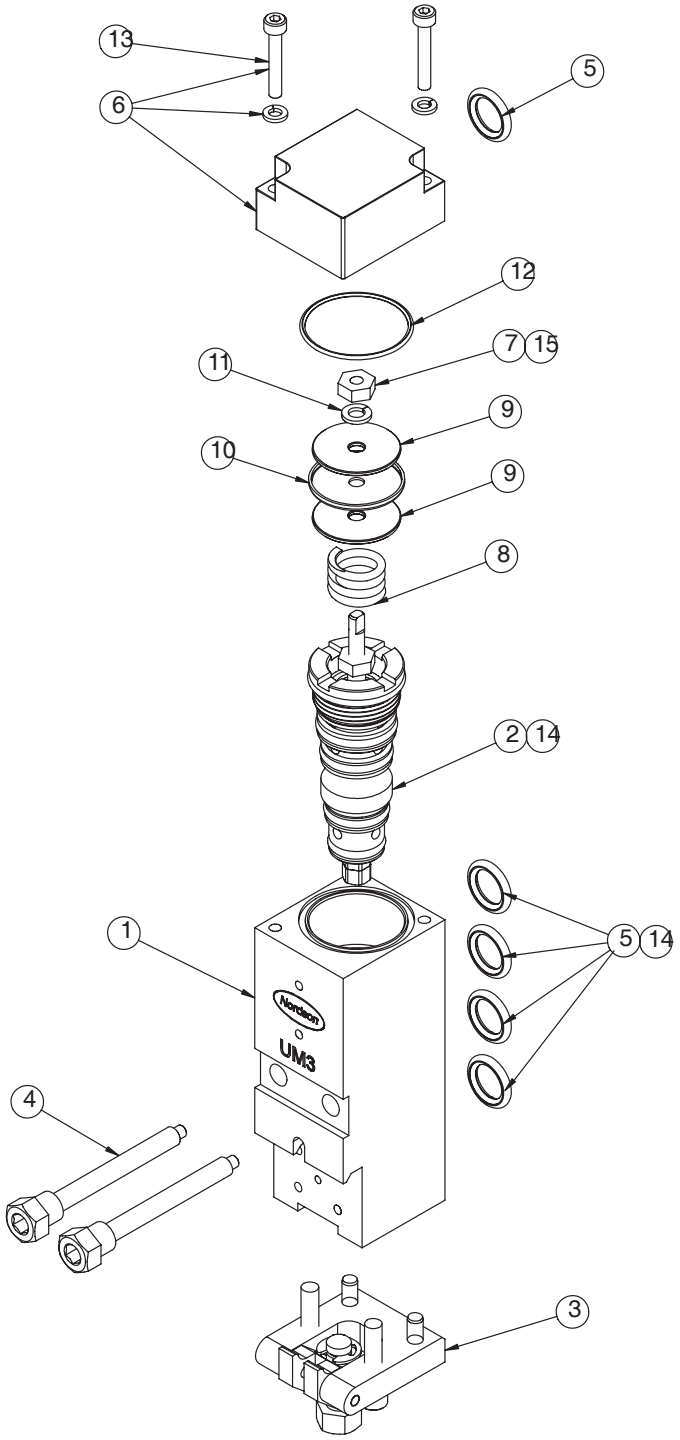


Figure 35 Right-angle standard spray module parts

High-Speed Coating Modules

See Figure 36.

Item	Part	Description	Quantity	Note
—	1057909	Module, coating, UM3, without solenoid valve	—	
—	1055208	Module, coating, UM3, with flange-mounted solenoid valve (FMS)	—	
1	- - - - - -	• Body, 3-way	1	
2	- - - - - -	• Assembly, cartridge	1	A
3	1050180	• Screw, mounting, M4	2	
4	940111	• O-ring, Viton, 0.301 ID x 0.070 W in.	5	
5	1057823	• Assembly, air cap, FMS	1	
5A	253890	• • O-ring, 3 x 1 mm	3	
6	- - - - - -	• Nut, hex, 5-40, small pattern	1	A
7	- - - - - -	• Spring, piston	1	A
8	- - - - - -	• Washer, piston	2	A
9	- - - - - -	• Seal, piston	1	A
10	- - - - - -	• Washer, lock, split, #5	1	A
11	1039719	• O-ring, Viton, 0.811 ID x 0.036 W in.	1	
12	—	• Item no. not used	—	
13	1019256	• Compound, anti-seize lubricant	AR	
14	900223	• Lubricant, O-ring, Parker, 4 oz	AR	
15	900470	• Adhesive, Loctite 272, red, high-temperature, 50 ml	AR	
—	1064679	Assembly, solenoid valve, 24V, high-temperature, fast-switch	1	B
16	1064268	• Solenoid, flange-mounted, high-temperature, 24V	1	B
17	1054167	• Isolator, UM3 solenoid heat	1	B

NOTE A: These parts are available in the module rebuild kit. Refer to *Module Service Kits* later in this section.

B: These parts are present only on module part number 1055208.

AR: As Required

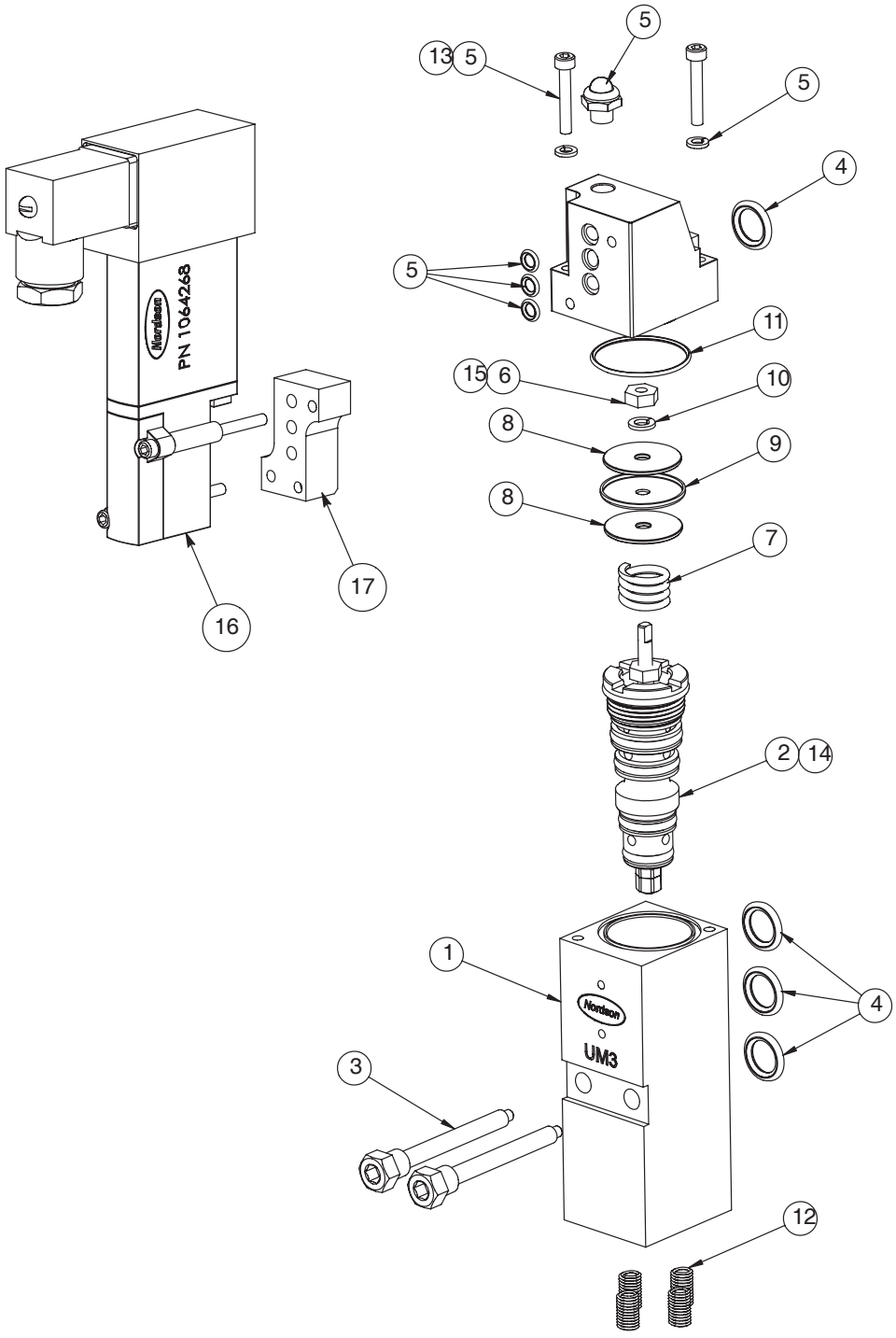


Figure 36 High-speed coating module parts

Standard Coating Modules

See Figure 37. These modules are used with manifold-mounted solenoid valves (MMS).

Item	Part	Description	Quantity	Note
—	1057926	Module, coating, UM3, standard	—	
—	1067140	Module, coating, UM3, stainless-steel	—	
1	- - - - - -	• Body, 3-way	1	
2	- - - - - -	• Assembly, cartridge	1	A
3	1050180	• Screw, mounting, M4	2	
4	940111	• O-ring, Viton, 0.301 ID x 0.070 W in.	5	
5	1057932	• Assembly, air cap, MMS	1	
	1061797	• Assembly, air cap, MMS, stainless-steel	1	
6	- - - - - -	• Nut, hex, 5-40, small pattern	1	A
7	- - - - - -	• Spring, piston	1	A
8	- - - - - -	• Washer, piston	2	A
9	- - - - - -	• Seal, piston	1	A
10	- - - - - -	• Washer, lock, split, #5	1	A
11	1039719	• O-ring, Viton, 0.811 ID x 0.036 W in.	1	
12	—	• Item no. not used	—	
13	1019256	• Compound, anti-seize lubricant	AR	
14	900223	• Lubricant, O-ring, Parker, 4 oz	AR	
15	900470	• Adhesive, Loctite 272, red, high-temperature, 50 ml	AR	

NOTE A: These parts are available in the module rebuild kit. Refer to *Module Service Kits* later in this section.

AR: As Required

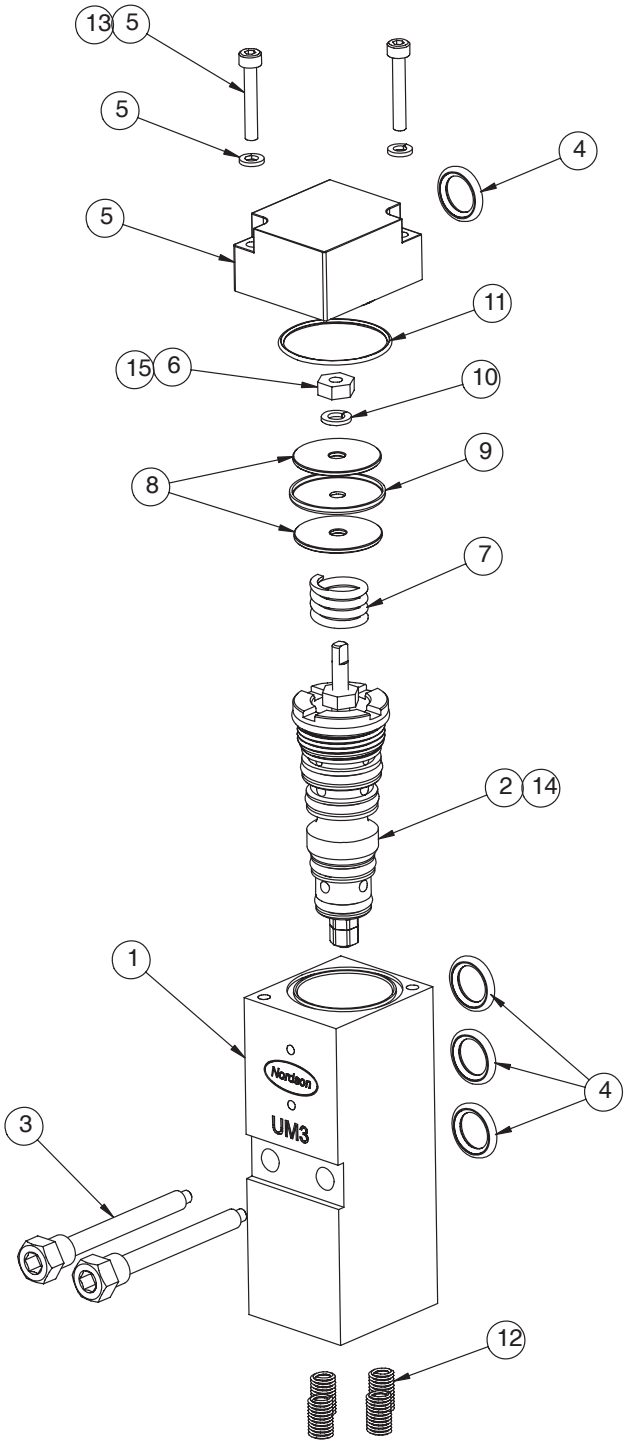


Figure 37 Standard coating module parts

Recirculation Module

See Figure 38.

Item	Part	Description	Quantity	Note
—	1077277	Module, recirculation, 3-way, AO/AC, 25 mm	—	
—	1077278	Module, recirculation, 3-way, AO/AC, 25 mm, stainless-steel	—	
1	- - - - - -	• Block, recirculation, 3-way, 25 mm	1	
2	940111	• O-ring, Viton, 0.301 ID x 0.070 W in.	5	
3	1050180	• Screw, UM3 module mounting, M4	2	
NS	900223	• Lubricant, O-ring, Parker, 4 oz	AR	A

NOTE A: Apply O-ring lubricant to all O-rings.

AR: As Required

NS: Not Shown

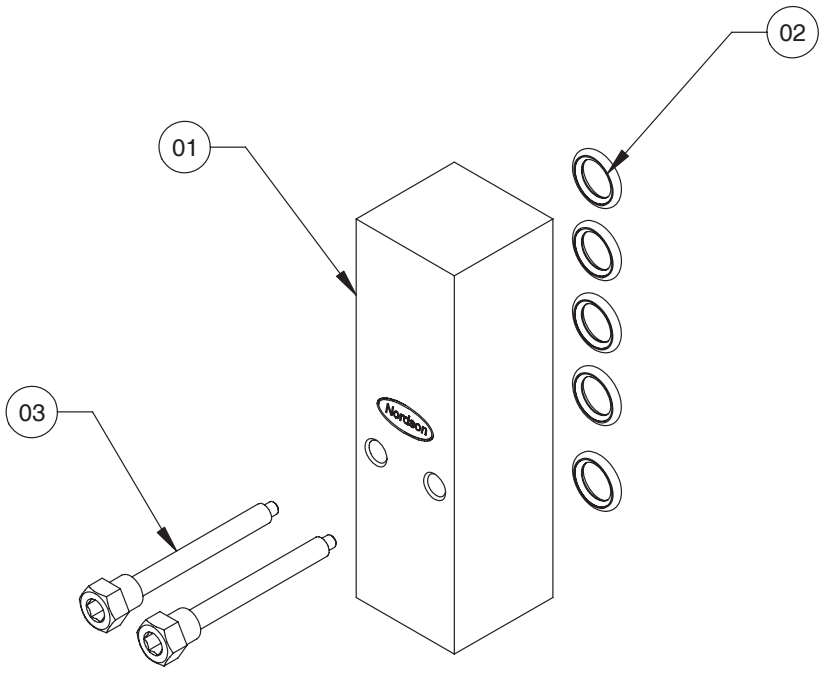


Figure 38 Recirculation module parts

Blank Module

See Figure 39.

Item	Part	Description	Quantity	Note
—	1077279	Module, blank, X200, 3-way	—	
1	- - - - - -	• Body, module, blank	1	
2	940111	• O-ring, Viton, 0.301 ID x 0.070 W in.	5	
3	1050180	• Screw, UM3 module mounting, M4	2	
NS	900223	• Lubricant, O-ring, Parker, 4 oz	AR	A

NOTE A: Apply O-ring lubricant to all O-rings.
AR: As Required
NS: Not Shown

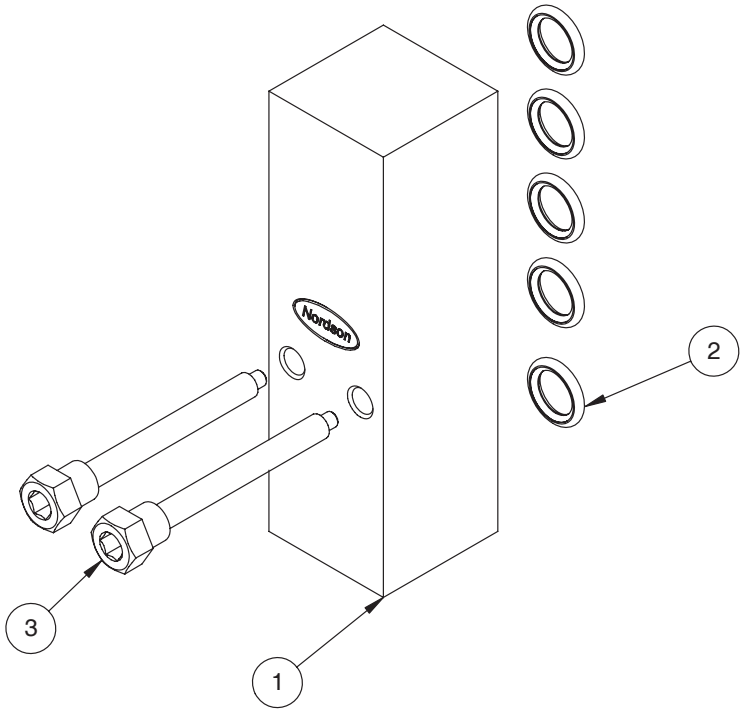


Figure 39 Blank module parts

Air-Only Module

See Figure 40.

Item	Part	Description	Quantity	Note
—	1074770	Module, blank, air-only	—	
1	- - - - - -	• Body, module, blank,air-only	1	
2	1048702	• Assembly, clamp, nozzle-retaining, standard	1	
3	1050180	• Screw, UM3 module mounting, M4	2	
4	940111	• O-ring, Viton, 0.301 ID x 0.070 W in.	5	
5	1019256	• Compound, anti-seize lubricant	AR	
6	900223	• Lubricant, O-ring, Parker, 4 oz	AR	
AR: As Required				

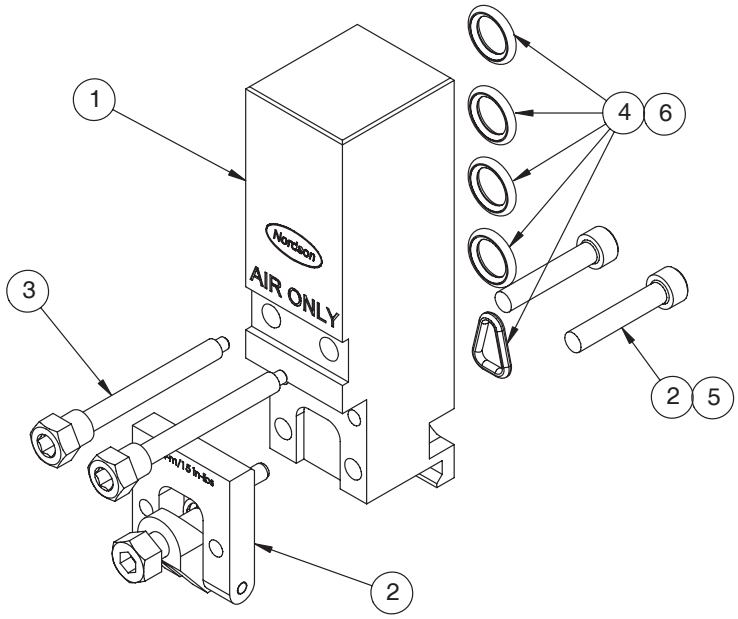


Figure 40 Air-only module parts

Nozzle-Retaining Clamp (Standard)

See Figure 41. The nozzle-retaining clamp is present only on spray modules.

Item	Part	Description	Quantity	Note
—	1048702	Nozzle-retaining clamp assembly, standard	—	
1	- - - - - - -	• Plate, clamp	1	
2	- - - - - - -	• Clamp, nozzle-retaining	1	
3	- - - - - - -	• Screw, clamp, hex, M5	1	
4	- - - - - - -	• Retaining ring, external, 18, E-ring	1	
5	- - - - - - -	• Pin, dowel, 0.0941 x 0.975 in.	1	
6	- - - - - - -	• Pin, dowel, 0.125 x 0.375 in.	2	
7	- - - - - - -	• Screw, socket, 8-32 x 0.875 in.	2	

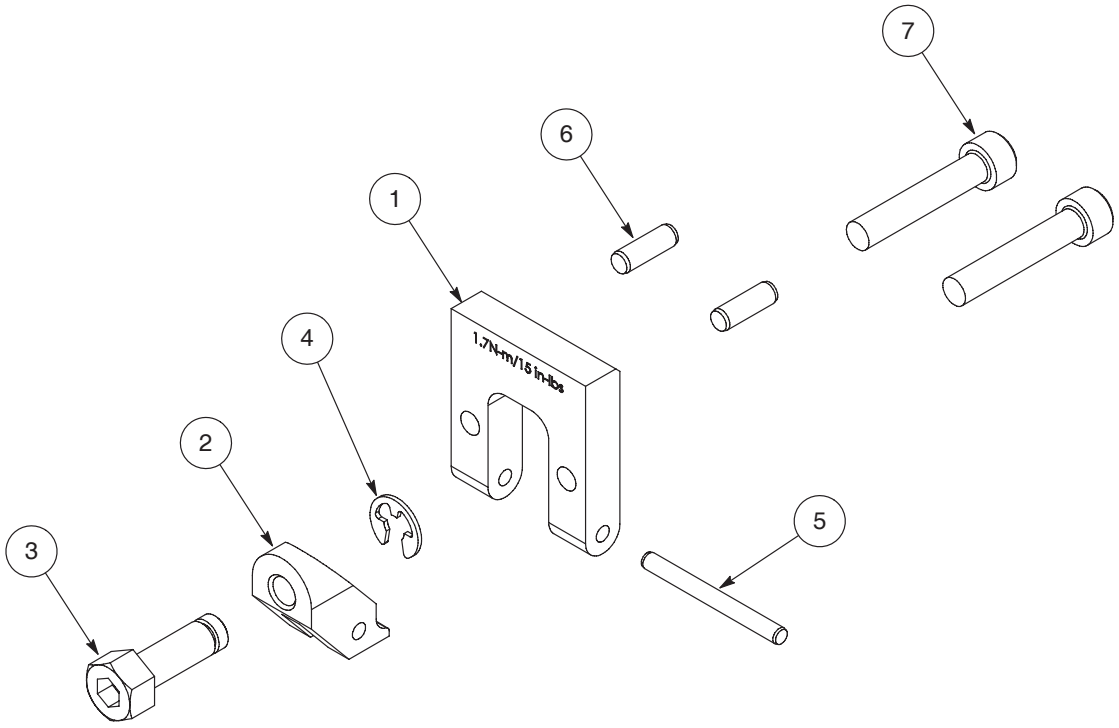


Figure 41 Standard nozzle-retaining clamp parts

Nozzle-Retaining Clamp (Right-Angle)

See Figure 42. The nozzle-retaining clamp is present only on spray modules.

Item	Part	Description	Quantity	Note
—	1050456	Nozzle-retaining clamp assembly, right-angle module	—	
1	- - - - - - -	• Plate, clamp	1	
2	- - - - - - -	• Clamp, nozzle-retaining	1	
3	- - - - - - -	• Screw, clamp, hex, M5	1	
4	- - - - - - -	• Retaining ring, external, 18, E-ring	1	
5	- - - - - - -	• Pin, dowel, 0.0941 x 0.975 in.	1	
6	- - - - - - -	• Pin, dowel, 0.125 x 0.375 in.	2	
7	- - - - - - -	• Screw, socket, 6-32 x 0.625 in.	2	

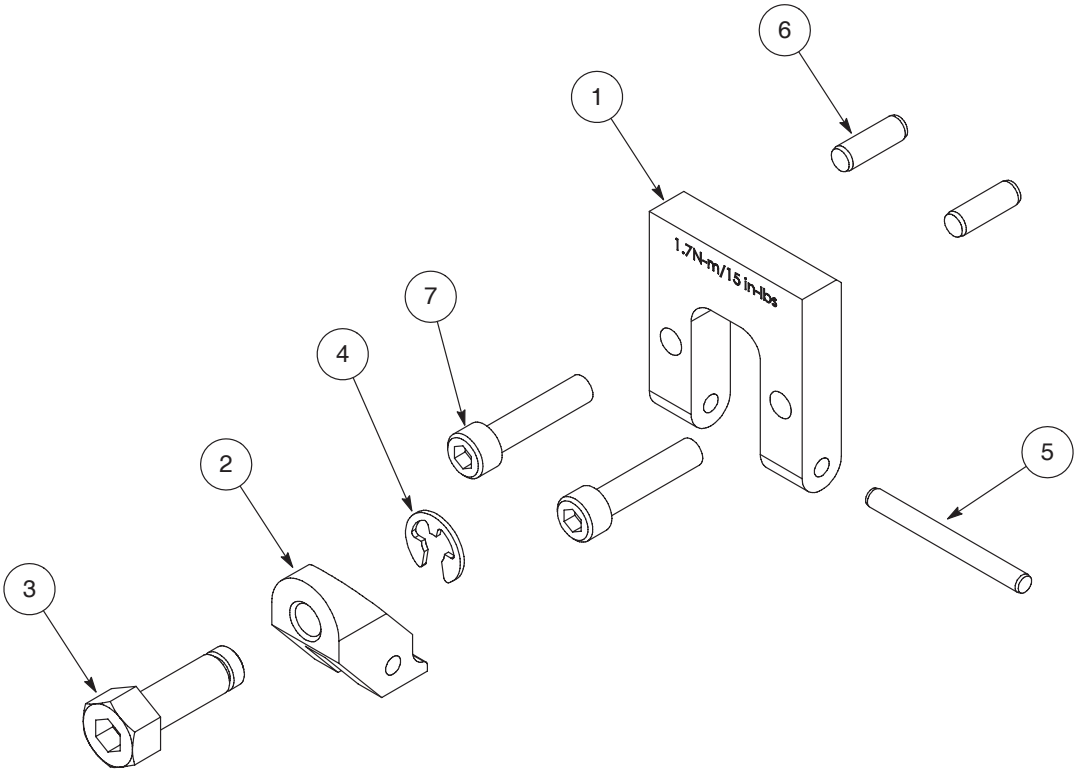


Figure 42 Right-angle nozzle-retaining clamp parts

Solenoid Valve Diverter Plate Assembly

See Figure 43. This assembly is required if you want to convert from manifold-mounted solenoid valves to flange-mounted solenoid valves.

Item	Part	Description	Quantity	Note
—	1050296	Solenoid diverter plate assembly	AR	
1	1050295	• Plate, solenoid input diverter	1	
2	1050298	• Gasket, solenoid diverter plate	1	
3	982611	• Screw, socket, M3.0.5 x 18	2	
AR: As Required				

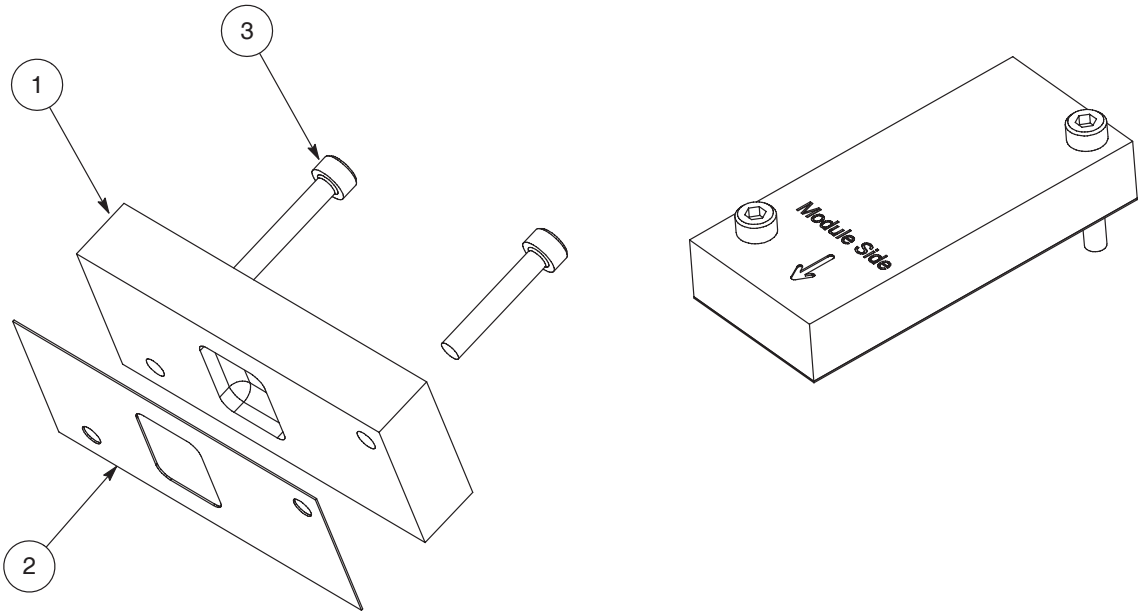


Figure 43 Solenoid valve diverter plate assembly parts

Spray Nozzle Adapter Part Numbers

See Figure 44. For some nozzles, including bead nozzles and CF disk and unibody nozzles, an adapter must be installed on the module. The following table provides the part numbers for available adapters.

NOTE: No adapter is required for Universal CF, meltblown, Summit, or SureWrap nozzles.

Item	Part	Description	Quantity	Note
1	1020732	Adapter, bead (for Saturn nozzles)	—	A
2	1019706	• O-ring, Viton, 0.146 ID x 0.031 W in.	1	
3	1020638	Adapter, CF (for CF disk and unibody nozzles)	—	
4	1019706	• O-ring, Viton, 0.146 ID x 0.031 W in.	1	
NOTE A: This adapter is used in non-spray applications, which are not covered by this manual. For more information on the use of this adapter, contact your Nordson representative.				

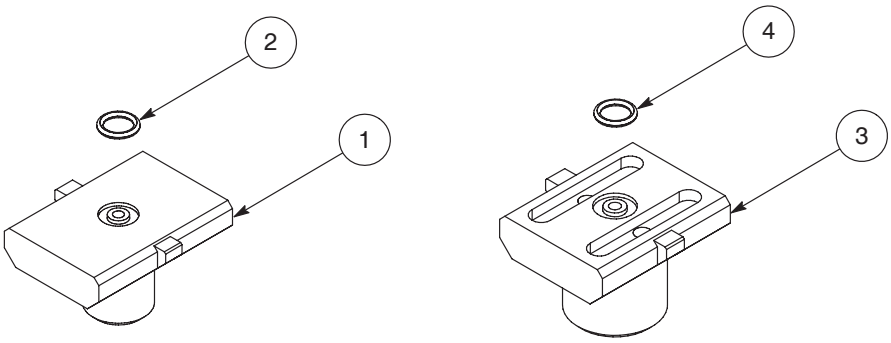


Figure 44 Nozzle adapters

This page intentionally left blank.

Spray Nozzle Part Numbers

Normally, the choice of nozzle for your applicator will have already been made by you and your Nordson representative. Refer to your sales order to determine what nozzle choices were made. The part numbers for the most commonly used nozzles are provided here.

NOTE: Some nozzles require the use of an adapter. Refer to *Spray Nozzle Adapter Part Numbers* earlier in this section for adapter part numbers.

CF Disk and Unibody Nozzles

The difference between CF disk and unibody nozzles is explained in Table 4. The nozzles may have either 6 air openings or 12 air openings. Nozzles with 12 air openings are referred to as high-frequency nozzles.

To use a CF disk or unibody nozzle with a Universal module, an adapter is required. Refer to *Spray Nozzle Adapter Part Numbers* earlier in this section for the CF adapter part number.

Table 4 CF Disk and Unibody Nozzles

CF Nozzle Type	Description
Disk	The nozzle disk and the nozzle-retaining nut are two separate parts. The disk is held onto the module by the nozzle-retaining nut and is protected from damage because it is recessed inside the nut.
Unibody or steel unibody	The nozzle disk and the nozzle-retaining nut are a single assembly. This design makes the nozzles easier to clean because there are no recessed surfaces (as on disk nozzles). However, the nozzle disks may be more susceptible to damage. The nozzle-retaining nuts on unibody nozzles are color-coded for ease of identification. Steel unibody nozzles are also available.

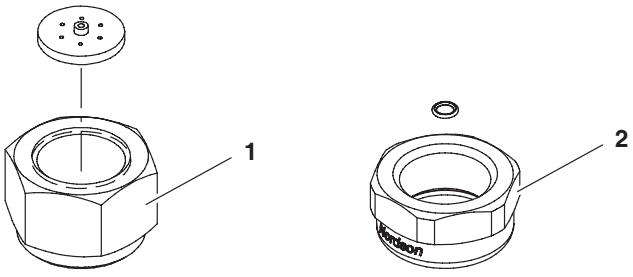


Figure 45 CF disk and unibody nozzles

1. CF disk nozzle (disk exploded)
2. CF unibody nozzle (O-ring exploded)

Table 5 CF Disk Nozzles (6 Air Openings)

Orifice Diameter	Pattern Width	Part Number
0.012 in.	Standard	860548
0.014 in.	Standard	860574
0.016 in.	Standard	860575
0.018 in.	Standard	860228
0.018 in.	Wide	1047073
0.018 in.	Wide	1047060
0.020 in.	Standard	860435
0.025 in.	Standard	100728
0.030 in.	Standard	810381
0.030 in.	Wide	1047075
0.050 in.	Standard	810300
NOTE: Use nozzle-retaining nut part 119202 with these nozzles.		

Table 6 High-Frequency CF Disk Nozzle (12 Air Openings)

Orifice Diameter	Pattern Width	Nozzle Part Number
0.018 in.	Standard	755316
NOTE: Use nozzle-retaining nut part 119202 with these nozzles.		

Table 7 CF Unibody Nozzles (6 Air Openings)

Orifice Diameter	Pattern Width	Nozzle Part Number
0.012 in.	Standard	152168
0.012 in.	Wide	1046126
0.014 in.	Standard	152169
0.016 in.	Standard	152170
0.018 in.	Standard	152171
0.018 in.	Wide	1046150
0.020 in.	Standard	152172
0.020 in.	Wide	1046151
0.025 in.	Standard	156698
0.025 in.	Wide	1046152
0.030 in.	Standard	152173
0.030 in.	Wide	1046156
0.040 in.	Standard	162500
NOTE: All nozzles include O-ring part 940031.		

CF Disk and Unibody Nozzles (contd)

Table 8 High Frequency CF Unibody Nozzles (12 Air Openings)

Orifice Diameter	Pattern Width	Nozzle Part Number
0.012 in.	Standard	755957
0.012 in.	Narrow	757537
0.014 in.	Standard	756306
0.016 in.	Standard	756307
0.018 in.	Standard	755530
0.018 in.	Wide	1046128
0.020 in.	Standard	756308
0.025 in.	Standard	756309
0.030 in.	Standard	756115
0.030 in.	Wide	1046154
0.046 in.	Standard	757399
0.046 in.	Wide	757469
NOTE: All nozzles include O-ring part 940031.		

Table 9 CF Steel Unibody Nozzles (6 Air Openings)

Orifice Diameter	Pattern Width	Nozzle Part Number	Color
0.012 in.	Standard	753488	Brown
0.014 in.	Standard	753489	Grey
0.016 in.	Standard	753491	Green
0.018 in.	Standard	753492	Blue
0.020 in.	Standard	753493	Red
0.025 in.	Standard	753494	Pink
0.030 in.	Standard	753495	Black
0.018 in.	Wide	1046158	Yellow
0.030 in.	Wide	1046160	Purple
0.040 in.	Standard	753496	Maroon
NOTE: All nozzles include O-ring part 940031.			

Universal CF Nozzles

Universal CF nozzles are one-piece, high-frequency CF nozzles with 12 air openings. No adapter is required to use a Universal CF nozzle on a UM3 module.

Orifice Diameter	Pattern Width	Nozzle Part Number
0.012 in.	Standard	1053960
0.012 in.	Wide	1053964
0.016 in.	Standard	1053961
0.016 in.	Wide	1053966
0.018 in.	Standard	1054730
0.018 in.	Wide	1054731
0.020 in.	Standard	1049565
0.020 in.	Wide	1052500
0.020 in.	14 mm	1053969
0.025 in.	Standard	1053962
0.025 in.	Wide	1053967
0.030 in.	Standard	1053963
0.030 in.	Wide	1053968
0.030 in.	18 mm	1053970
NOTE: All nozzles include O-ring part 1019706.		

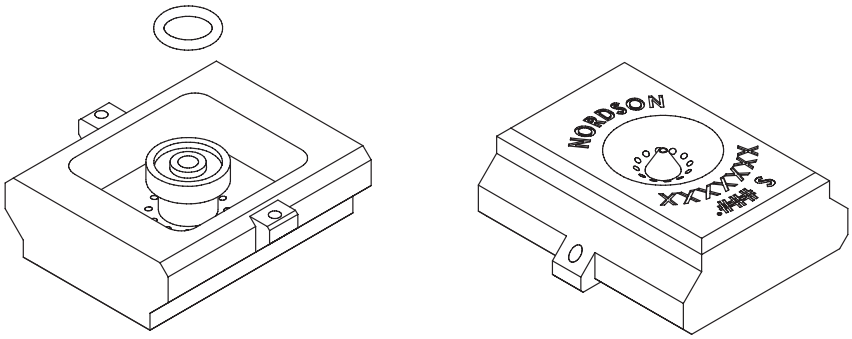


Figure 46 Universal CF nozzle

Meltblown Nozzles

Meltblown nozzles may be full coverage or partial coverage nozzles. They may also be high or low-density nozzles (high-density nozzles apply a heavier, denser coating than low-density nozzles).

- See Figure 47. A full coverage, high-density nozzle has 24 openings that extend along the entire length of the nozzle. A full-coverage, low-density nozzle has 12 openings that extend along the entire length of the nozzle. The adhesive coating width in either case is 25 mm.
- A partial coverage high- or low-density nozzle has openings through only part of the nozzle, leaving a closed area at either one or both ends. A partial coverage nozzle may be oriented to apply adhesive starting at the left, right, or center of the nozzle. Various nozzle widths are available in either side-oriented or center-oriented configurations. Note that the nozzles are symmetrical, which means that a partial coverage nozzle can be positioned for either right-side or left-side coverage.

No adapter is required to use a meltblown nozzle on a UM3 spray module.

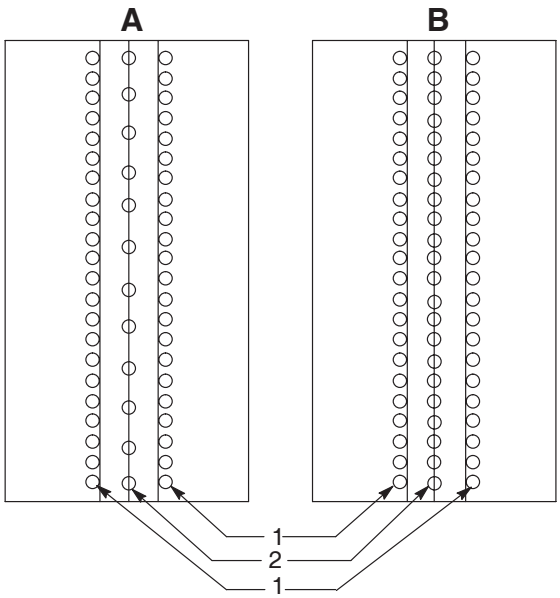


Figure 47 Air and adhesive openings on meltblown full coverage low-density (A) and high-density (B) nozzles

1. Air openings
2. Adhesive openings

Table 10 Meltblown High-Density Nozzles

Number of Openings	Coating Width	Distance Between Openings	Orientation of Openings	Brass Nozzle Part Number
0 (air only)	Not applicable	Not applicable	Not applicable	1042077
6	~6 mm (1/4 in.)	0.877 mm	Left or right	1042313
12	~12–13 mm (1/2 in.)	0.877 mm	Left or right	1042311
18	~19 mm (3/4 in.)	0.877 mm	Left or right	1042606
24	~25 mm (1 in.)	0.877 mm	Full	1037124
NOTE A: The Universal meltblown nozzle is symmetrical. Nozzles may be positioned for right- or left-side coverage. B: Meltblown nozzles use O-ring part 1022028. C: Stainless-steel nozzles are available. Contact your Nordson representative for information.				

Table 11 Meltblown Low-Density Nozzles

Number of Openings	Coating Width	Distance Between Openings	Orientation of Openings	Brass Nozzle Part Number
0 (air only)	Not applicable	Not applicable	Not applicable	1042077
3	~6 mm (1/4 in.)	1.833 mm	Left or right	1042315
6	~12–13 mm (1/2 in.)	1.833 mm	Left or right	1042314
9	~19 mm (3/4 in.)	1.833 mm	Left or right	1042605
12	~25 mm (1 in.)	1.833 mm	Full	1038130
NOTE A: The Universal meltblown nozzle is symmetrical. Nozzles may be positioned for right- or left-side coverage. B: Meltblown nozzles use O-ring part 1022028. C: Stainless-steel nozzles are available. Contact your Nordson representative for information.				

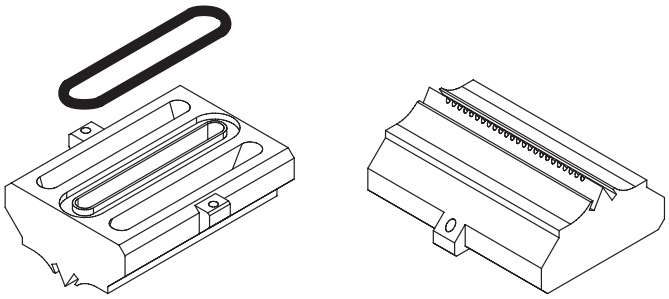


Figure 48 Meltblown nozzle

Summit Nozzles

A Summit laminating nozzle has one to four adhesive openings that are oriented to apply adhesive starting at the left, right, or center of the nozzle. The adhesive coating width ranges from 6–25 mm (0.25–1.00 in.), depending on the number of openings.

No adapter is required to use a Summit nozzle on a UM3 spray module.

Table 12 Summit Laminating Nozzles

Number of Openings	Coating Width	Distance Between Openings	Orientation of Openings	Brass Nozzle Part Number	Stainless-Steel Nozzle Part Number
1	~6 mm ($^1/_4$ in.)	not applicable	Left or right	1035875	1035877
		not applicable	Center	1035876	1035878
2	~12–13 mm ($^1/_2$ in.)	6.25 mm	Left or right	1035879	1035881
			Center	1035880	1035882
3	~19 mm ($^3/_4$ in.)	6.25 mm	Left or right	1035629	1035884
		6.25 mm	Center	1035883	1035885
4	~25 mm (1 in.)	6.25 mm	Full	1035886	1035887

NOTE A: The Universal Summit nozzle is symmetrical. Nozzles may be positioned for right- or left-side coverage.
B: Summit nozzles use O-ring part 1022028.

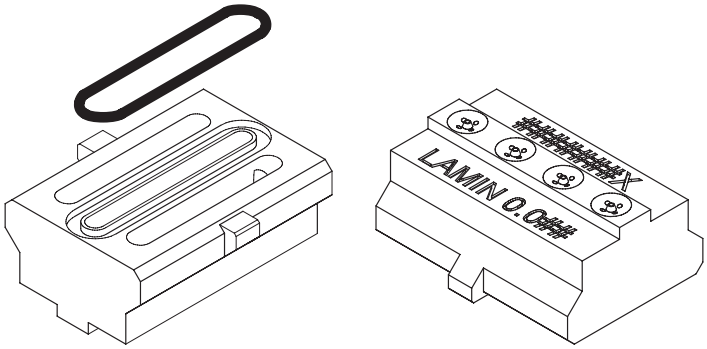


Figure 49 Summit laminating nozzle

SureWrap Nozzles

SureWrap nozzles are available for elastic applications. A SureWrap nozzle has one adhesive opening for each elastic strand on a product. The spacing of the adhesive openings corresponds to the spacing of the elastic strands on the product. SureWrap nozzles are available in both thin and wide sizes and the adhesive openings may be biased left or right from center for special applications. SureWrap nozzles may also be custom-drilled. All SureWrap nozzles have a hard-release coating to resist wear and facilitate cleaning.

No adapter is required to use a SureWrap nozzle on a UM3 module.

Table 13 SureWrap Thin Elastic Coating Nozzles

Number of Openings	Distance Between Openings	Bias from Centerline	Nozzle Part Number
1	not applicable	0	1037088
2	4 mm	0	1038123
	5 mm	0	1035789
3	4 mm	0	1038514
	5 mm	0	1038516
4	4 mm	0	1041343
	5 mm	0	1042583
5	5 mm	0	1057493

NOTE A: Adhesive openings are centered on the nozzle unless otherwise noted.

B: SureWrap nozzles may be custom-drilled. Contact your Nordson representative for more information.

C: SureWrap nozzles use O-ring part 1022028.

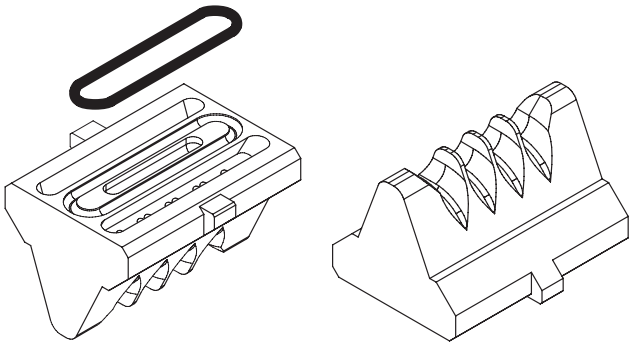


Figure 50 SureWrap elastic coating nozzle

SureWrap Nozzles *(contd)*

Table 14 SureWrap Wide Elastic Coating Nozzles

Number of Openings	Distance Between Openings	Bias from Centerline	Nozzle Part Number
1	not applicable	0	1042945
2	4 mm	0	1045582
	5 mm	0	1042946
3	4 mm	0	1043767
	5 mm	0	1042947
4	4 mm	0	1043768
	5 mm	0	1051663

NOTE A: Adhesive openings are centered on the nozzle unless otherwise noted.

B: SureWrap nozzles may be custom-drilled. Contact your Nordson representative for more information.

C: SureWrap nozzles use O-ring part 1022028.

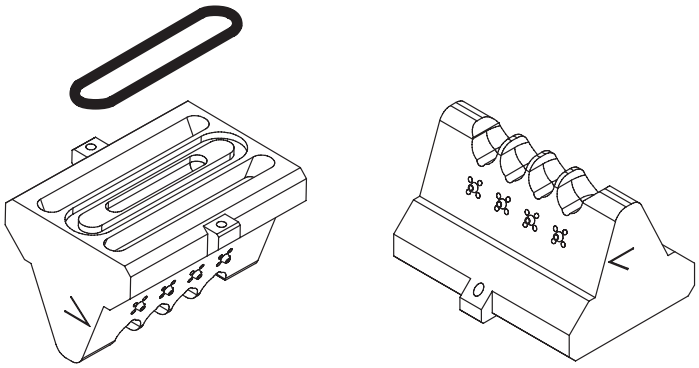


Figure 51 SureWrap wide elastic coating nozzle

Coating Nozzle Parts

See Figure 52.

Item	Part	Description	Quantity	Note
—	- - - - - -	Assembly, coating nozzle	—	A
1	- - - - - -	• Shim	1	A
2	- - - - - -	• Mouthpiece, front	1	A
3	- - - - - -	• Mouthpiece, rear	1	A
4	940060	• O-ring, Viton, 0.125 x 0.250 x 0.063 in.	AR	
5	982517	• Screw, socket, M4 x 20	AR	
6	982349	• Screw, socket, M4 x 16	AR	
7	985424	• Pin, dowel, 0.125 x 0.500 in.	AR	

NOTE A: Because coating nozzles are custom-made, this part number varies depending on the configuration of the coating nozzle assembly. Refer to your applicator-specific documentation.

AR: As Required

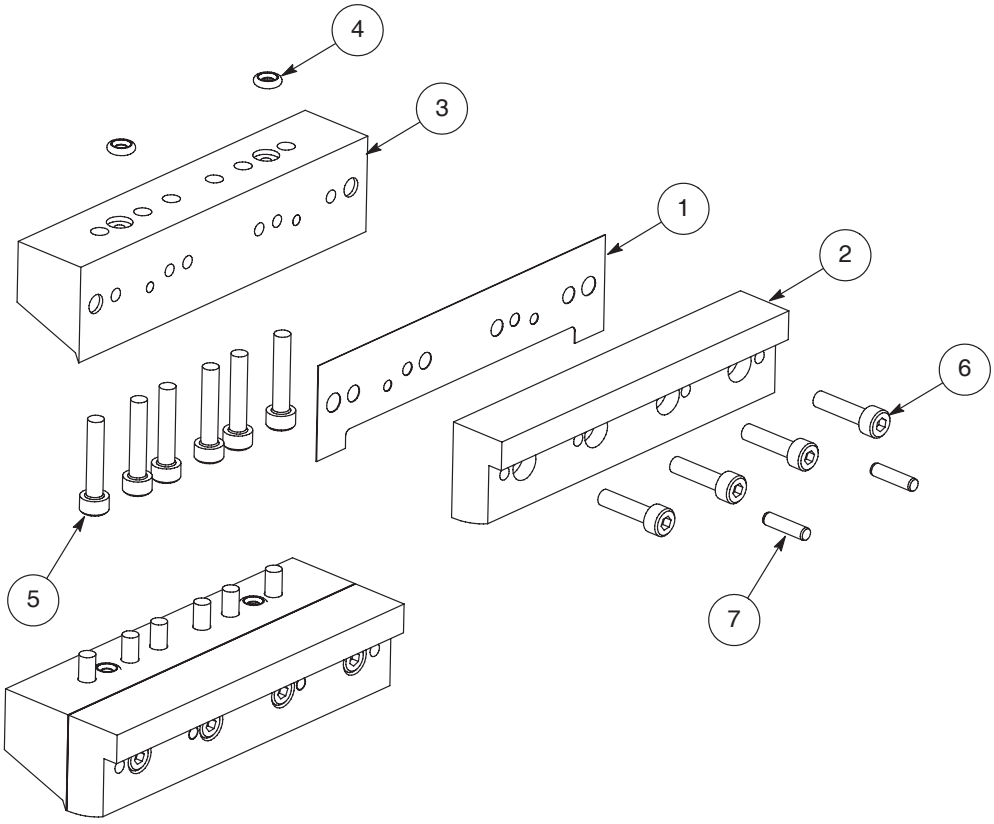


Figure 52 Coating nozzle parts (typical)

Module Service Kits

See Figure 53.

Item	Part	Description	Quantity	Note
—	1055570	Kit, rebuild, major, UM3 module	—	
—	1065276	Kit, rebuild, major, UM3 module, stainless-steel	—	
1	- - - - - -	• Assembly, cartridge	1	
2	- - - - - -	• Spring, piston	1	
3	- - - - - -	• Piston, module, 3-way	2	
4	- - - - - -	• Seal, piston, 3-way	1	
5	- - - - - -	• Washer, lock, split, #5	1	
6	- - - - - -	• Nut, hex, 5-40, small pattern	1	
7	1039719	• O-ring, Viton, 0.811 ID x 0.036 W in.	1	
8	204211	• Silencer, M5	1	
9	227156	• Washer, lock, spring, M2.5	2	
10	1008495	• Screw, socket, cap, M2.5, 16, mm, black	2	
11	940111	• O-ring, Viton, 0.301 ID x 0.070 W in.	5	
12	900223	• Lubricant, O-ring, Parker, 4 oz	AR	
13	253890	• O-ring, 3 x 1 mm	3	
—	1057930	Kit, tool, rebuild, UM3 module	—	
14	- - - - - -	• Tool, cartridge	1	
15	- - - - - -	• Wrench, module stem	1	
—	1064679	Assembly, solenoid valve, 24V, high-temperature, fast-switch	1	A
16	1064268	• Solenoid, flange-mounted, high-temperature, 24V	1	A
17	1054167	• Isolator, UM3 solenoid heat	1	A

NOTE A: These parts are present only on module part numbers 1050136 and 1055208.

AR: As Required

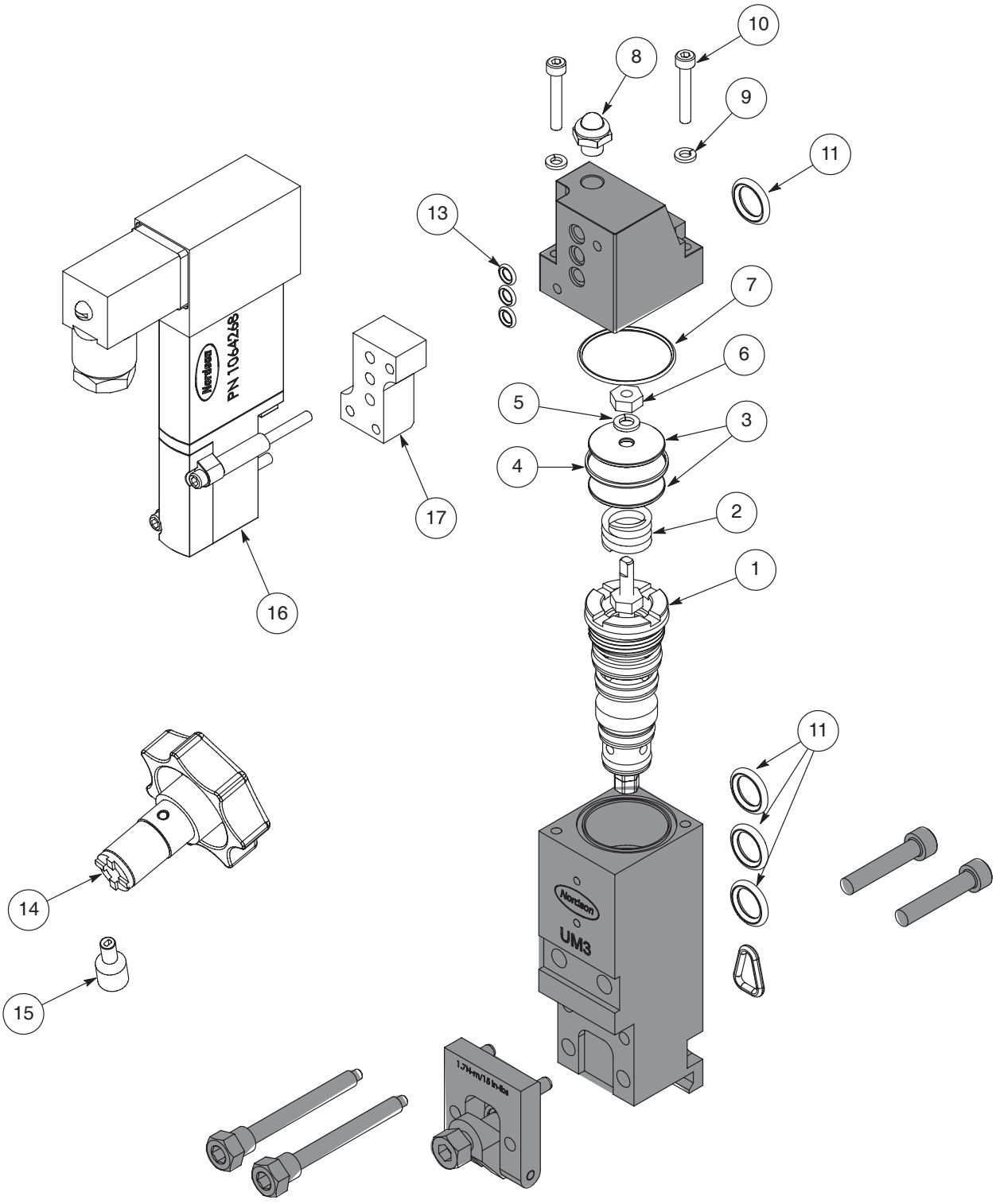


Figure 53 Module service kit parts

Note: Shaded items are not included in the module rebuild kit.

Recommended Spare Parts and Supplies

Part	Description	Note
- - - - - -	Modules, UM3	A
1050180	• Screw, mounting, M4 (2 required to secure the module to the applicator)	
940111	• O-ring, Viton, 0.301 ID x 0.070 W in. (5 required for the back of the module)	
1064679	Assembly, solenoid valve, 24V, high-temperature, fast-switch (includes heat isolator)	
1064268	• Solenoid, flange-mounted, high-temperature 24V	
1057823	Air cap assembly, high-speed (FMS)	
1057932	Air cap assembly, standard (MMS)	
1061797	Air cap assembly, standard, stainless-steel (MMS)	
1048702	Nozzle-retaining clamp assembly, standard (spray modules only)	
1050456	Nozzle-retaining clamp assembly, right-angle (spray modules only)	
1055570	Kit, rebuild, major, UM3	
1065276	Kit, rebuild, major, UM3, stainless-steel	
1057930	Kit, tool, rebuild, UM3 (includes tools needed to facilitate module rebuilding)	
- - - - - -	Spray nozzles	B
119202	• Nozzle-retaining nut (CF disk nozzles)	
940031	• O-ring, Viton, 0.087 x 0.127 x 0.020 in. (CF unibody nozzles)	
1019706	• O-ring, Viton, 0.146 ID x 0.031 W in. (Universal CF nozzles)	
1022028	• O-ring, 75 Viton, 0.578 ID x 0.040 in (meltblown, Summit, and SureWrap nozzles)	
1019706	• O-ring, Viton, 0.146 ID x 0.031 W in. (nozzle adapters)	
133665	Kit, CF unibody nozzle O-rings (contains 10 part 940031 O-rings)	
133664	Kit, CF unibody nozzle O-rings (contains 25 part 940031 O-rings)	
133663	Kit, CF unibody nozzle O-rings (contains 100 part 940031 O-rings)	
754766	Wrench, torque, CF disk nozzles, 2.3 N•m (20 in.-lb)	
754767	Wrench, torque, CF unibody nozzles, 0.56 N•m (5 in.-lb)	
901915	Kit, nozzle cleaning, small orifice	
231100	Kit, nozzle cleaning, large orifice	
- - - - - -	Coating nozzles	C
940060	• O-ring, Viton, 0.125 x 0.250 x 0.063 in. (required quantity varies)	
900223	Lubricant, O-ring, Parker, 4 oz (for O-rings)	
1019256	Compound, anti-seize and lubricant (for screw threads)	
900470	Adhesive, Loctite 272, red, high-temperature, 50 ml (for the hex nut)	

NOTE A: Refer to Table 2 under *Description* for module part numbers.

B: Refer to *Spray Nozzle Part Numbers* earlier in this section for available nozzles.

C: Refer to your applicator-specific documentation for coating nozzle assembly part numbers.

Technical Data

Applicator Specifications

Table 15 provides specifications for an applicator with UM3 modules. Refer to the applicator manual or to your applicator-specific documentation for the following information about your applicator:

- applicator dimensions
- cordset style
- number and orientation of filters
- number of modules
- type and number of solenoid valves

Table 15 UM3 Applicator Specifications

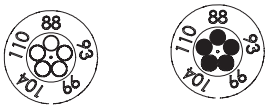
Item	Specification
Operating temperature	70–204 °C (160–400 °F)
System hydraulic pressure	90 bar (1,300 psi) maximum
Module-actuating air pressure	4.1 bar (60 psi) minimum
Pattern air pressure	CF: 0.3–3.4 bar (5–50 psi); 0.8–1.2 bar (12–18 psi) typical Meltblown: 2.1–3.1 bar (30–45 psi) typical Summit: 0.3–1.7 bar (5–25 psi) typical SureWrap: 0.5–1.5 bar (7–22 psi); 0.8 bar (12 psi) typical
Pattern air temperature	Meltblown: 16–27 °C (30–50 °F) above the adhesive application temperature typical Other applications: 9–15 °C (15–25 °F) above the adhesive application temperature typical
Air consumption	~7.1–56.6 nlm (~0.25–2.0 scfm), depending on the application (higher for meltblown, lower for Summit)
Adhesive viscosity	500–12,000 cps
Adhesive applications supported	CF, meltblown, Summit, SureWrap
Adhesive pattern capability	Continuous or intermittent
Mounting height	CF: 19–51 mm (0.75–2.0 in.) above substrate typical Meltblown: 19–51 mm (0.75–2.0 in.) above substrate typical Summit: 12–25 mm (0.5–1.0 in.) above substrate typical SureWrap: contact

Continued...

Applicator Specifications *(contd)*

Table 15 UM3 Applicator Specifications *(contd)*

Item	Specification
Solenoid valve supply voltage (See Note A)	24 VDC only (without spiked output)
Solenoid valve maximum operating temperature (See Note B)	99 °C (210 °F)
NOTE A: The solenoid valve used on flange-mounted solenoid valve (FMS) modules must be connected to a PLC or control unit that supplies a stabilized 24 VDC signal without spiked output. Higher voltage will damage the solenoid valve. B: The maximum temperature of the solenoid valve used on FMS modules is exceeded if the 104 °C and/or 110 °C dots on the temperature-indicating sticker turn black, as shown in the illustration below. If this occurs, valve life will be shortened.	



Temperature-indicating sticker:

If the 104 °C and 110 °C dots are white, the operating temperature has not been exceeded

If either of the 104 °C or 110 °C dots is black, the operating temperature has been exceeded

Torque Specifications

These torque specifications are also stated within the appropriate procedures.

Item	Torque Specification
Air cap screws	1.02–1.13 N•m (9–10 in.-lb)
5-40 nut	2.3–2.8 N•m (20–25 in.-lb)
Spray module mounting screws	3.4 N•m (30 in.-lb)
Spray nozzle retaining clamp screw	1.7 N•m (15 in.-lb)
CF disk nozzles	3.4 N•m (30 in.-lb)
CF unibody nozzles	0.6 N•m (5 in.-lb)
Coating module mounting screws	2.8–3.4 N•m (25–30 in.-lb)
Coating nozzle assembly screws	2.8–3.4 N•m (25–30 in.-lb)