Two-Component Meter

Customer Product Manual
Part 331 161A

NORDSON CORPORATION • AMHERST, OHIO • USA

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Notice

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Two-Component Meter

1. Safety

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

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

Qualified Personnel

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

Intended Use

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

Some examples of unintended use of equipment include

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

Regulations and Approvals

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

Personal Safety

To prevent injury follow these instructions.

- Do not operate or service equipment unless you are qualified.
- Do not operate equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Keep clear of moving equipment. Before adjusting or servicing moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.
- Relieve (bleed off) hydraulic and pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- While operating manual spray guns, make sure you are grounded. Wear electrically conductive gloves or a grounding strap connected to the gun handle or other true earth ground. Do not wear or carry metallic objects such as jewelry or tools.
- If you receive even a slight electrical shock, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.
- Obtain and read Material Safety Data Sheets (MSDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- Make sure the spray area is adequately ventilated.
- To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.

High-Pressure Fluids

High-pressure fluids, unless they are safely contained, are extremely hazardous. Always relieve fluid pressure before adjusting or servicing high pressure equipment. A jet of high-pressure fluid can cut like a knife and cause serious bodily injury, amputation, or death. Fluids penetrating the skin can also cause toxic poisoning.

If you suffer a fluid injection injury, seek medical care immediately. If possible, provide a copy of the MSDS for the injected fluid to the health care provider.

The National Spray Equipment Manufacturers Association has created a wallet card that you should carry when you are operating high-pressure spray equipment. These cards are supplied with your equipment. The following is the text of this card:

WARNING: Any injury caused by high pressure liquid can be serious. If you are injured or even suspect an injury:

- Go to an emergency room immediately.
- Tell the doctor that you suspect an injection injury.
- Show him this card.
- Tell him what kind of material you were spraying.

MEDICAL ALERT—AIRLESS SPRAY WOUNDS: NOTE TO PHYSICIAN

Injection in the skin is a serious traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is a concern with some exotic coatings injected directly into the bloodstream.

Consultation with a plastic surgeon or a reconstructive hand surgeon may be advisable.

The seriousness of the wound depends on where the injury is on the body, whether the substance hit something on its way in and deflected causing more damage, and many other variables including skin microflora residing in the paint or gun which are blasted into the wound. If the injected paint contains acrylic latex and titanium dioxide that damage the tissue's resistance to infection, bacterial growth will flourish. The treatment that doctors recommend for an injection injury to the hand includes immediate decompression of the closed vascular compartments of the hand to release the underlying tissue distended by the injected paint, judicious wound debridement, and immediate antibiotic treatment.

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Ground all conductive equipment in the spray area. Use only grounded air and fluid hoses. Check equipment and workpiece grounding devices regularly. Resistance to ground must not exceed one megohm.
- Shut down all equipment immediately if you notice static sparking or arcing. Do not restart the equipment until the cause has been identified and corrected.
- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Do not heat materials to temperatures above those recommended by the manufacturer. Make sure heat monitoring and limiting devices are working properly.
- Provide adequate ventilation to prevent dangerous concentrations of volatile particles or vapors. Refer to local codes or your material MSDS for guidance.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Shut off electrostatic power and ground the charging system before adjusting, cleaning, or repairing electrostatic equipment.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

Halogenated Hydrocarbon Solvent Hazards

Do not use halogenated hydrocarbon solvents in a pressurized system that contains aluminum components. Under pressure, these solvents can react with aluminum and explode, causing injury, death, or property damage. Halogenated hydrocarbon solvents contain one or more of the following elements:

Element	Symbol	Prefix
Fluorine	F	“Fluoro-”
Chlorine	Cl	“Chloro-”
Bromine	Br	“Bromo-”
Iodine	I	“Iodo-”

Check your material MSDS or contact your material supplier for more information. If you must use halogenated hydrocarbon solvents, contact your Nordson representative for information about compatible Nordson components.

Action in the Event of a Malfunction

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

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

Disposal

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

2. Description

This manual provides an overview of the various parts of the two-component dispensing system. The two-component meter is one part of the two-component dispensing system. This manual also explains the components within the two-component meter and their functions.

Following is a brief description of each component of the two-component dispensing system.

See Figure 1. The Nordson two-component dispensing system is a robot/pedestal-mounted dispensing device developed specifically for the application of two-component materials.

The two-component dispensing system is designed for high-speed application of two-component materials such as epoxy. The two-component dispensing system incorporates positive displacement metering modules to precisely measure the major and minor material. The metered material then flows to a dispense gun, where it is mixed and dispensed as a bead.

The metering system dispensing ratios are fixed at 1:1, 2:1, 4:1, or other ratios per the customer's needs. Ratios can only be changed by replacing the metering modules. No adjustment is necessary after the change-out of major or minor materials.

The metering system can easily accommodate materials that contain fillers. Non-restrictive system passages, valves and orifices are designed to allow fillers to pass through without packing out.

The modular design of the system allows for easy change-out of component materials, as well as easy maintenance and repair of the metering modules. Individual parts can be changed without replacing the entire metering assembly. All parts are mounted via pins and bolts to a base manifold, permitting part changes to be completed while the metering assembly is still mounted to the robot or pedestal.

The metering unit and control valves are pneumatically operated. A clean, dry supply of plant air at 1.0 scfm, 4.80 bar (70 psi) is required.

The sub-systems within the two-component dispensing system work with a plant's robotic set-up. These sub-systems include a

- bulk unloader pumping system,
- temperature conditioning system (optional),
- system controller,
- dispense gun, and
- metering unit assembly.

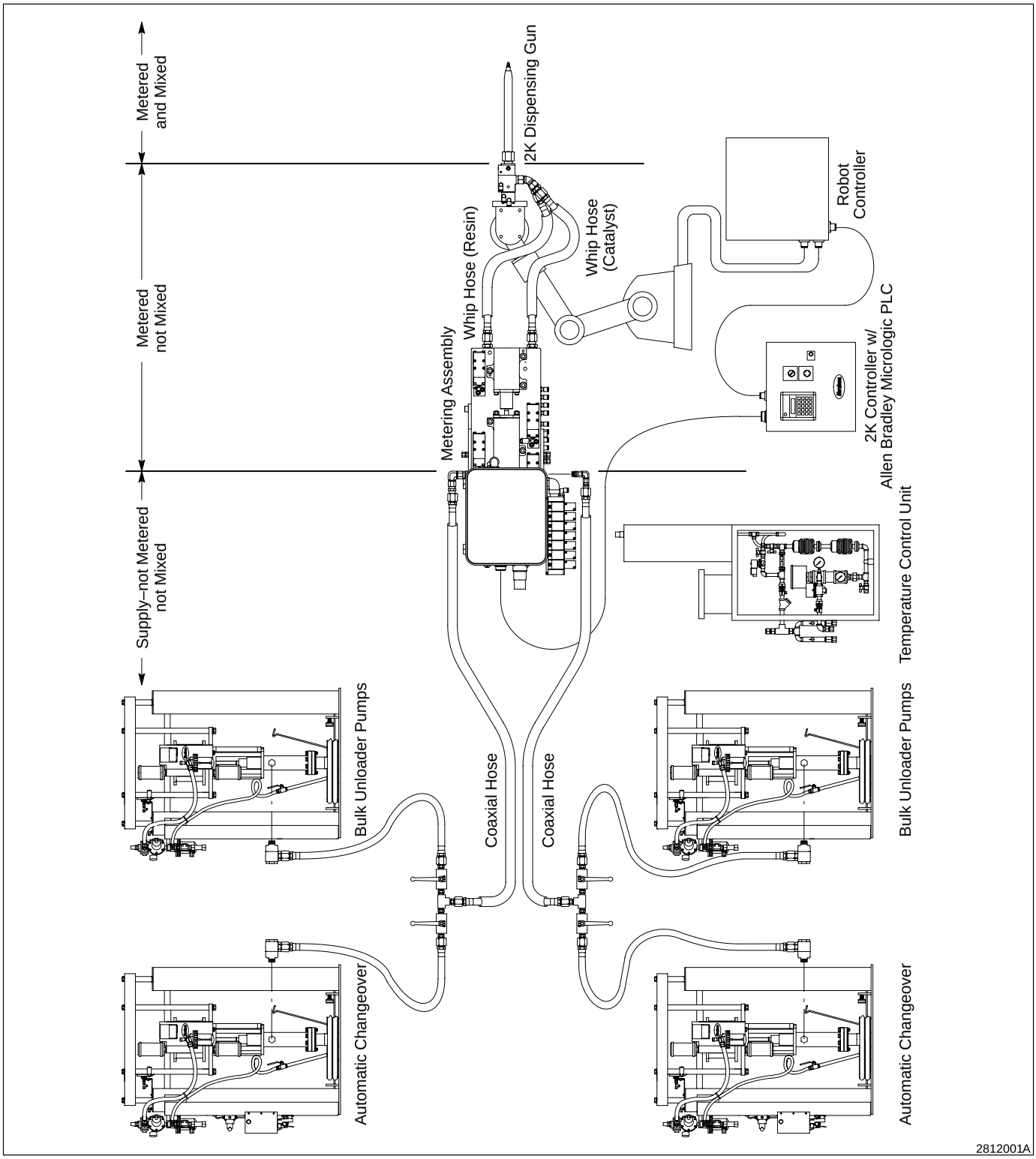


Fig. 1 Typical Two-Component Dispensing System

Unloader

This system uses Nordson Rhino Bulk unloaders. Refer to the *Rhino Bulk Unloaders* manual for information on their use.

Temperature Conditioning System (Optional)

See Figure 2 for the coolant path of the temperature conditioning system. All hardware in the two-component dispensing system has the ability to be temperature conditioned. This includes the on/off gun, the meter, and material hoses.

Temperature is maintained at +/- 2 °C or °F of the material manufacturer's required dispensing temperature to assure constant material viscosity. Constant viscosity results in a consistent bead profile on the part, regardless of changes in ambient temperature inside the plant.

The material leaves the bulk unloaders and enters a temperature-conditioned hose that conditions the material to the desired setpoint as it is pumped to the metering valve. After the material has been metered, it exits the temperature-conditioned metering assembly through water-traced hoses to the dispense gun. This system uses water (with rust inhibitor added) for the cooling and heating process.

If the temperature conditioning system becomes disabled, the dispensing system will still be able to function until the system can be repaired.

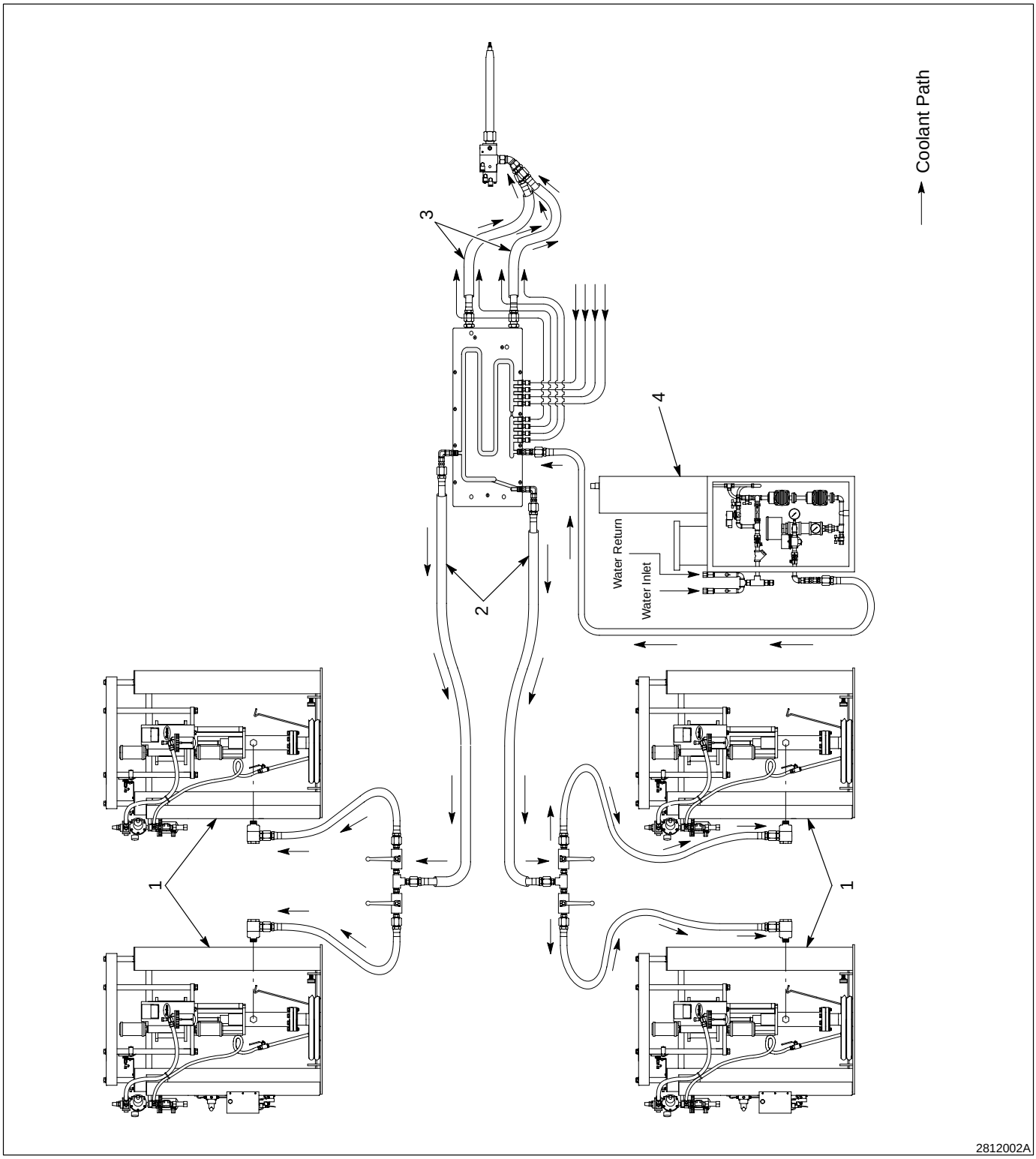


Fig. 2 Typical Coolant Path

1. Bulk unloaders
2. Coaxial hoses
3. Whip hoses
4. Temperature control unit

Two-Component Controller

The Programmable Logic Controller (PLC) is the controller for the two-component dispensing system. The PLC operates the various functions of the meter and is programmed to communicate with any robot used in the process.

The PLC has diagnostic capabilities that include self-testing and fault detection. It continually monitors the dispensing operations so that any faults can be relayed to the robot and displayed so that the operator can take corrective measures.

Refer to the *Two-Component Controller* manual for further information and instructions on the use of the controller.

Dispense Gun

See Figure 3. A two-part, anti-drool, on/off dispense gun is mounted at the end of the robot arm. Within the gun, major and minor components are kept separate until they enter a disposable static mixer tube. This tube mixes the two-component materials before they reach the dispensing tip, which allows the material to evenly cure when dispensed. The static mixer tube is protected by a shroud that is designed to allow quick changes of the disposable mixer tube.

The gun is fed by separate, stainless steel braided, PTFE-lined hoses from the robot-mounted meter. In most applications, the length of the hoses does not exceed 3.66 meters (12 feet). These hoses are designed to minimize hose swell to maximize system response.

Refer to the *Two-Component Dispensing Gun* manual for further information on the dispense gun.

Dispense Gun *(contd.)*

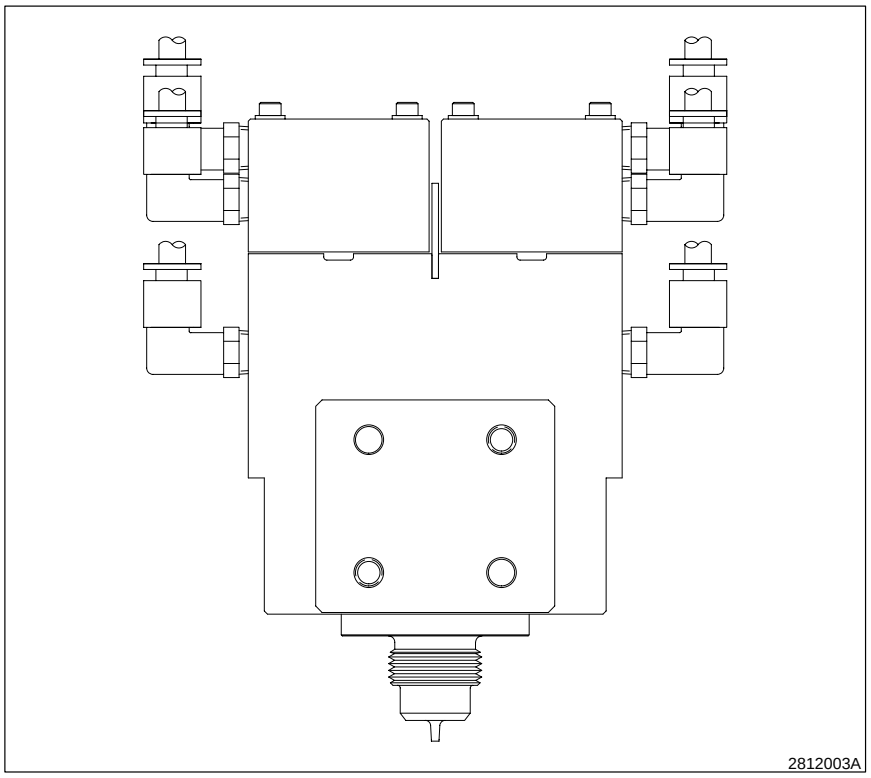


Fig. 3 Dispense Gun

Gun Types

There are two types of guns that may be used with the dispensing system. Based on the material you are dispensing, you will have either a stainless steel gun or an aluminum gun.

There are different types of cartridges for use with different types of material. There are aluminum and stainless steel cartridges, with different types of seals for each based on the material you are using.

The aluminum gun cartridges use different seal material based on the major and minor components.

The stainless steel gun has stainless steel cartridges, and only uses one type of seal.

Dispense Types

The dispense gun is capable of delivering material to the part in an extruded bead, a stream, or a swirl spray with the change of a nozzle.

- Extrude—the gun dispenses a bead from a nozzle that has a hole the same size as the bead required. The tip of the nozzle needs to be 1 to $1^1/_2$ bead diameters away from the part.
- Stream—high pressure pushes material through a small orifice, producing a bead on a part.
- Swirl—a bead like a streamed bead surrounded with tangential air jets. The air produces a swirling flow of air that shapes the bead into a swirl pattern.

Two-Component Meter

See Figure 4. The basic two-component meter is designed for applications that dispense material at a constant speed. Major and minor materials are dispensed onto the part at the proper volume and ratio at a constant robot speed.

The two-component meter takes the major and minor materials supplied by the Rhino pumps and proportions them to the proper ratio. The two metering cylinders have different internal areas, so the proper mix is always dispensed by volume.

The two-component meter measures each component by volume. It is customized to specify mix ratio by volume. If the specific gravity of the component changes, the weight ratio will change, even though the volume ratio does not.

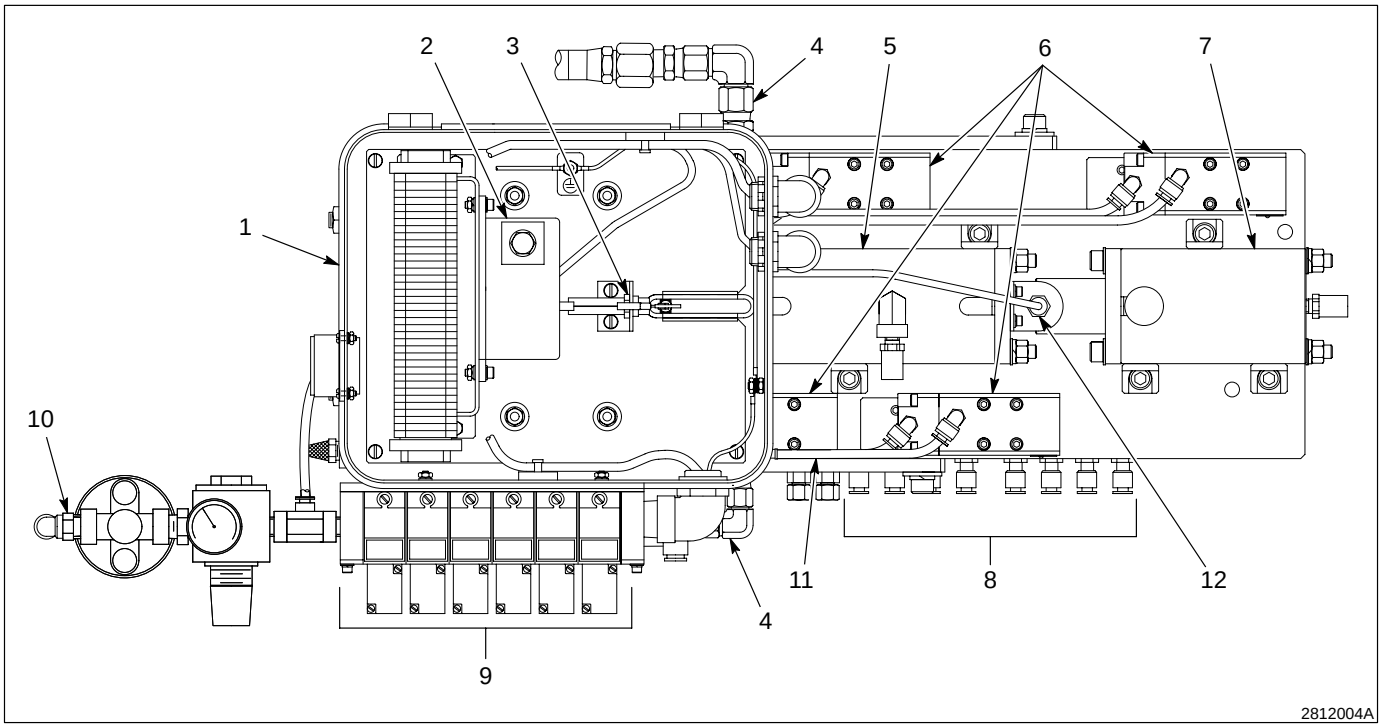


Fig. 4 Two-Component Meter

1. Junction box
2. Encoder
3. Proximity switch — minor cylinder
4. Material supply hose fittings
5. Minor metering cylinder
6. Inlet/outlet valves
7. Major metering cylinder
8. Temperature conditioning water lines
9. Solenoid valve pack
10. Air filter regulator
11. Air control lines
12. Proximity switch — major cylinder

Inlet/Outlet Valves

See Figure 4. The two-component inlet/outlet valves (6) are compact, high-cycle dispensing valves. These on/off valves open and close the adhesive path.

When air is supplied to the valve-open air inlet, the piston is pushed upward, pulling the ball tip off the seat. Material flows into the material inlet, then to the material outlet. When air is supplied to the valve-close air port, the piston is forced downward, pushing the ball tip back in the seat and stopping material from dispensing.

Cylinders

See Figure 4. The two-component metering cylinders are mounted on the metering unit manifold using socket head cap screws. The major cylinder (7) carries the major component from the major-in valve to the major-out valve. The minor metering cylinder (5) carries the minor component from the minor-in valve to the minor-out valve. O-rings between the cylinders and manifold prevent leaks.

The cylinders contain plungers which are activated by the drive cylinder. A push rod is housed within the minor cylinder's plunger and moves to push the major cylinder plunger.

Junction Box and Drive Cylinder

See Figure 4. The junction box (1) houses the encoder (2) and encoder rod, the minor metering cylinder proximity switch (3), and the wiring for the system.

Mounted on the exterior of the junction box is the solenoid valve pack (9). Underneath the junction box is the drive cylinder that operates the metering cylinder.

Air Control Lines

See Figure 4. Clean, plant air is supplied to the air filter regulator (10) in a constant flow. A control valve is used to direct plant air to the open or close sides of the piston. The dispense gun will not operate effectively without maintaining a minimum air pressure of 4.8 bar (70 psi).

Air control lines (11) connected to the major and minor sides open and close the dispense gun.

Material Supply Hoses

See Figure 4. The dispense gun has two material inlet ports, one located on the major side and the other located on the minor side.

The sizes of the material hoses and fittings (4) may vary depending on the system.

NOTE: Hoses and fittings for the major and minor sides differ in size. Make sure you do not switch the major and minor hoses.

Supply and Return Temperature Conditioning Water Lines

Temperature conditioning water lines (8) are used to route water to the temperature conditioning hose jackets from the meter base.

3. Theory of Operation

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

Two-Component Dispensing System

See Figure 1. Table 1 outlines how the two-component dispensing system operates.

Refer to Table 1 for the valve conditions for each operation of the metering device (closed = off; open = on).

NOTE: When a solenoid light is on, the corresponding valve/gun should be open.

Table 1 Valve Conditions

		METER/VALVES				GUN OR ROBOT	
Operation	**Drive**	**Minor IN**	**Minor OUT**	**Major IN**	**Major OUT**	**Minor Dispense Gun**	**Major Dispense Gun**
Dispense/ Purge	Open	Closed	Open	Closed	Open	Open	Open
Refill	Closed	Open	Closed	Open	Closed	Closed	Closed
Bleed (minor)	Closed	Open	Open	Closed	Closed	Open	Closed
Bleed (major)	Closed	Closed	Closed	Open	Open	Closed	Open

Metering Cylinders

The metering cylinders are positively filled by pressure from the unloader pumps. They are coupled during the dispense mode to maintain the proper ratios and decoupled on refill. This is done so that no vacuum can be created that would pull air into the unit.

The two-component meter operates in two primary phases: refill and dispense. Following is a description of what occurs in each phase.

Refill

See Figure 5. In the refill phase, the drive cylinder de-energizes and the air motor retracts. The major-in and minor-in valves are open. The unloader pumps pressurize the metering cylinders and cause them to refill independently from each other.

Once the plungers of both cylinders are retracted and are registered by their respective proximity switches, the inlet valves shut off. The cylinders are full of material and the unit enters the “wait” phase.

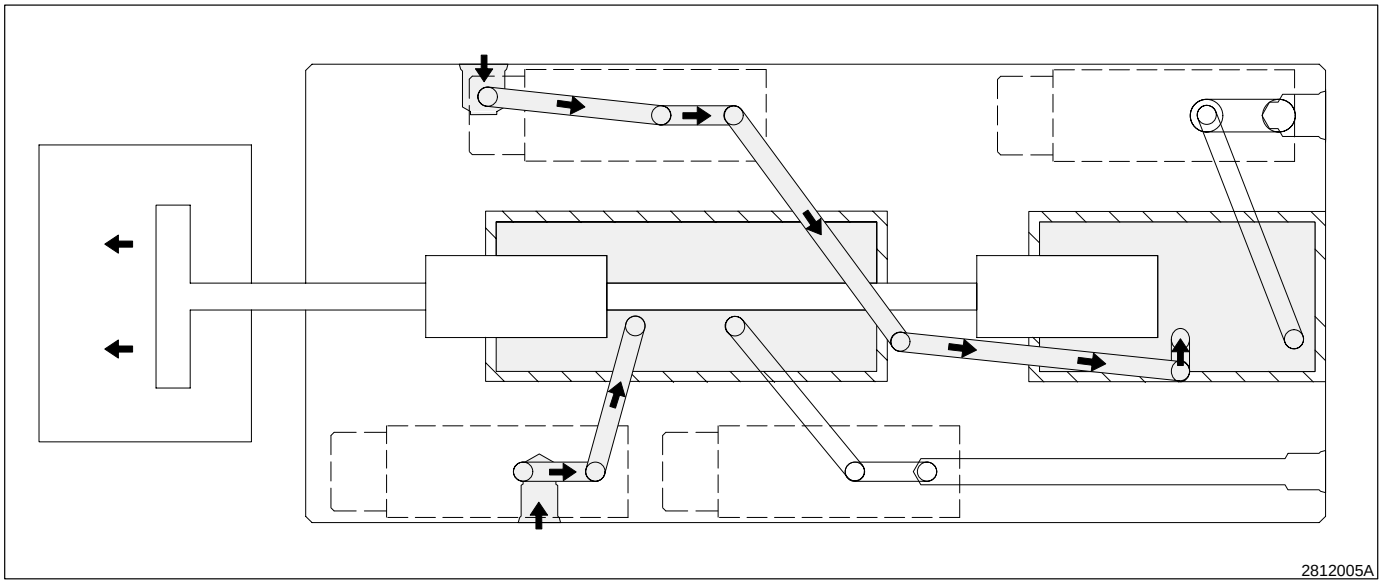


Fig. 5 Refill

Dispense

See Figure 6. In the dispense phase, the major-out valve and the minor-out valve open. The drive cylinder is pressurized and pushes on the plunger of the minor metering cylinder. The drive rod also pushes through the minor cylinder on the push rod, which drives the major metering cylinder plunger.

The major and minor dispense solenoids energize and the dispense gun opens and dispenses material.

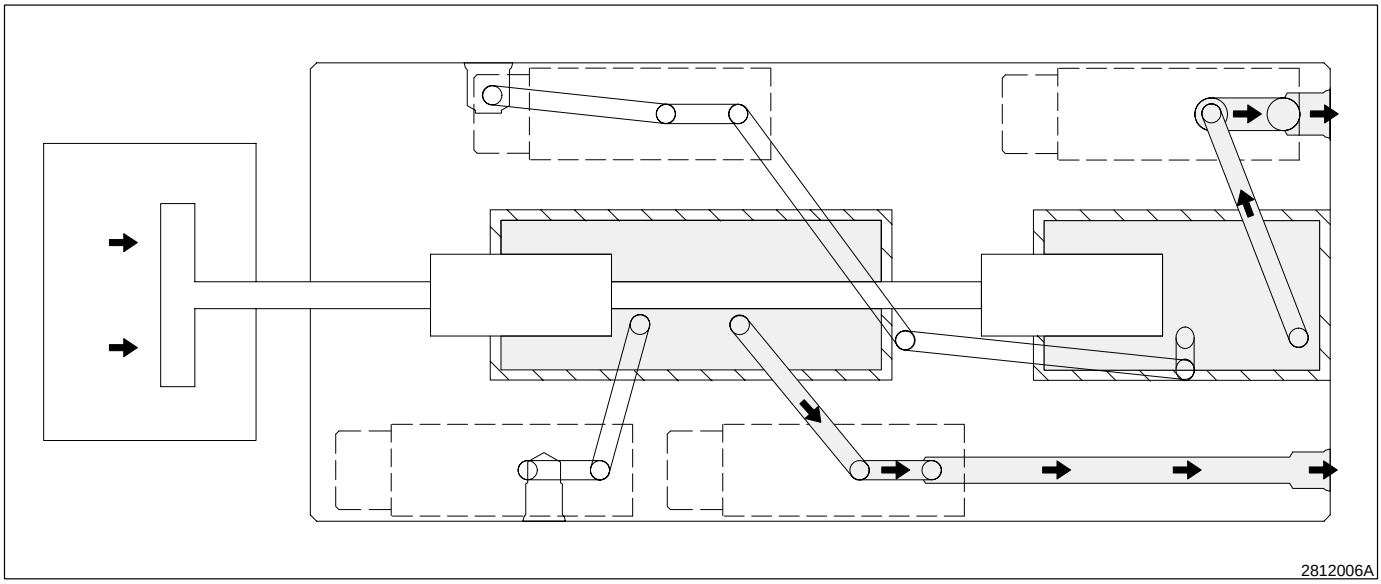


Fig. 6 Dispense

Bleed

See Figures 7 and 8. Bleeding the system is accomplished from the main PLC enclosure.

The bleed function opens all three valves for one component. This allows the supply pump to purge material through the system.

NOTE: The bleed function does not meter the material.

This test only determines that the associated valve stays open. To ensure they close properly, you must use the single valve test.

***Bleed** (contd.)*

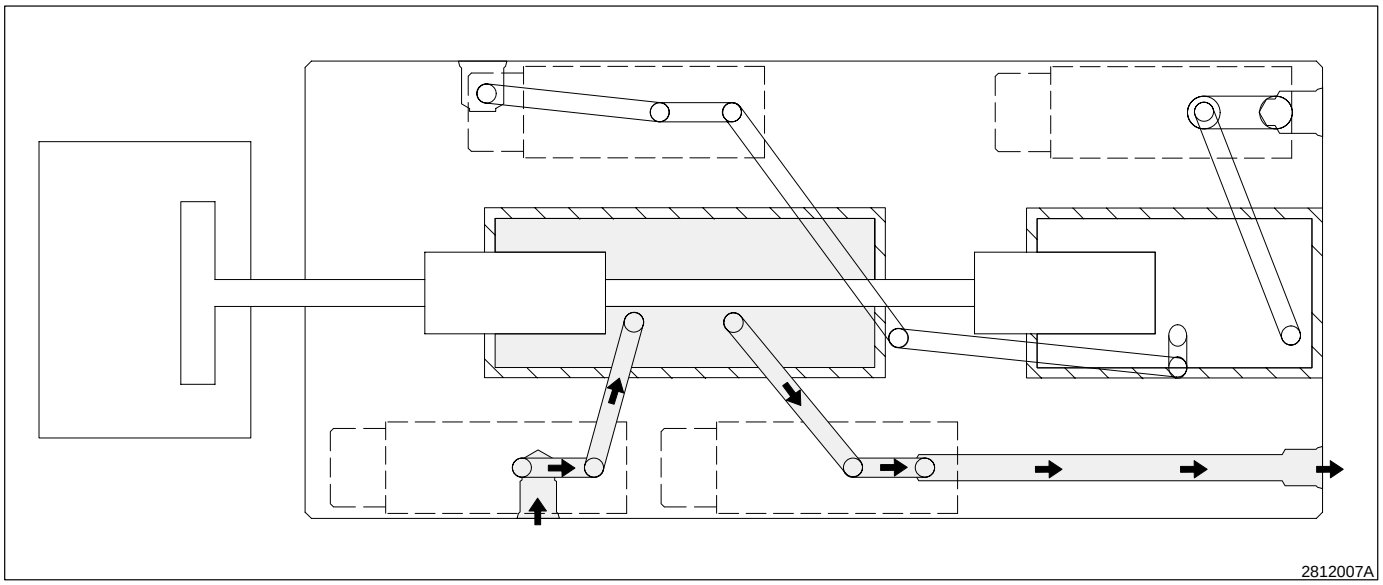


Fig. 7 Bleed Minor

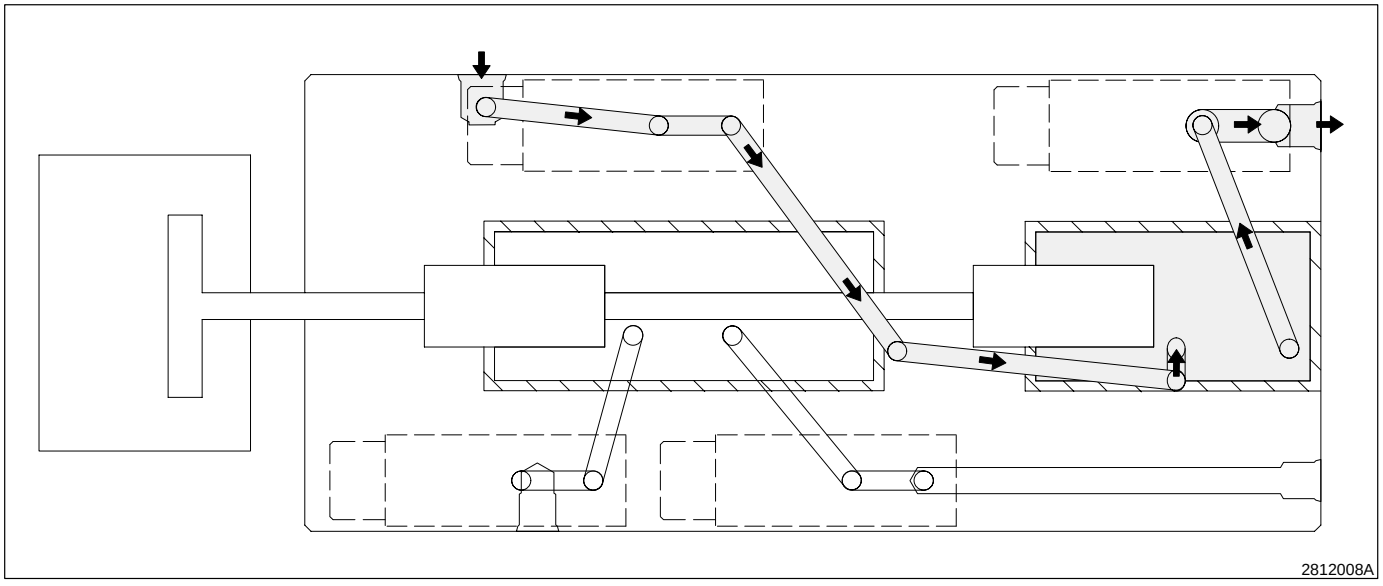


Fig. 8 Bleed Major

4. Operation

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

To ensure smooth operation of the two-component metering unit, perform the following daily start-up procedure.

1. Ensure the bulk unloader pumps are operational. Refer to the *Rhino Bulk Unloader* manual for information on their use.
2. Make sure the PLC is powered up. Refer to the *Two-Component Controller* manual for further information.
3. Check to make sure that adequate plant air is available.
4. Remove the mixer tube from the dispense gun and purge the system.
5. Perform a ratio check. Refer to *Ratio Test* in the *Diagnostics* section for the procedure on how to perform a ratio test.
6. Install a new mixer tube on the dispense gun.
7. Perform a purge to fill the mixer tube with fresh material.
8. The equipment is now ready for operation.

5. Diagnostics

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

Routine Diagnostics

To follow are some of the basic diagnostic procedures you will need to ensure smooth operation of the two-component dispensing system.

NOTE: All diagnostic procedures are performed with the mixer tube removed from the dispense gun.

Inspect for Leaks

Inspect for leaks in the following areas:

- Weep holes in valves,
- Weep holes in cylinders, and
- Hoses and fittings.

Small amounts of weepage indicate a potential problem, but will not affect mix ratios. Any weepage should be repaired as soon as possible. Large leakage from blown O-rings or loose fittings will affect material ratios and need to be fixed immediately.

Purge/Refill

Check the purge bucket and empty if necessary.

Purge operates the system in its normal dispense and refill mode. The material is metered through the valves and cylinders. Push the purge button or pedal. The system should dispense and refill. Have a co-worker check the dispensing, refilling, and refill complete lights on the front panel while you are dispensing. The outlet valves must be open and the inlet valves closed for the purge to operate properly.

If the purge does not work properly, check the

- LED's on solenoids,
- inlet/outlet valves, and
- supply pump pressure.

NOTE: GUN ON and PART STROBE signals must be low in order to refill.

Single Valve Test

Start with the bleed procedure. Open all of the valves. Turn off one valve at a time to make sure it closes. Any one valve closed will stop the bleed.

NOTE: A manual button energizes the solenoids.

To test the individual solenoids and the inlet/outlet valves in the minor material section of the metering device, manually energize two of the three solenoids for a bleed. Material should flow when the third solenoid is energized and stop when the third solenoid is off.

This procedure verifies the operation of the third valve. Repeat for all three valves. It is important that the material flow stops quickly when the valve is cycled. If the material flow tapers down and trickles to a stop, the inlet/outlet valve is operating sluggishly and should be replaced.

NOTE: Each solenoid operates an inlet/outlet valve on the metering unit.

Full Stroke Purge

If the mix ratio is off, it is important to know if there is too much of one material or not enough of the other. The daily ratio checks should be performed by stroking the metering unit to its full capacity and purging until the material flow stops. Both streams of material should start and stop together. If the ratio is off, the weights should be compared to previous tests to see which component is off.

If the component weight of a full stroke purge sample is low, that material is leaking from the system. A thorough inspection of the system should pinpoint the source of the leak. If the weight is too high, the most likely cause is a leaky inlet valve causing the system to bleed that component during a purge rather than metering it. The inlet valve and its solenoids should be checked for proper operation using the single valve test. Another cause of high volume is trapped air in a cylinder.

Trapped Air in Metering Cylinder

Trapped air acts like an accumulator in the metering cylinder. At the end of the full stroke purge, a cylinder with air will continue to flow whereas a cylinder without air will quickly stop flowing. Each system is different. It is important that the operator and skilled trades personnel experience proper operation of the system so they can detect any change in flow characteristics which accompany a fault condition.

If trapped air in the cylinders is suspected, bleed the material using the bleed procedure, then repeat the full stroke purge.

Ratio Test

1. Obtain two 5 ounce paper cups. Label one cup A and the other cup B.

2. Using a digital balance capable of weighing 0.1 gram, weigh container A to the nearest 0.1 gram. Record the weight of container A on line 1 of the worksheet.

3. Using the same balance, weigh container B to the nearest 0.1 gram. Record the weight of container B on line 1 of the worksheet.

4. Remove the static mix nozzle from the robot.

5. Clean the end of the two-component dispense gun by wiping the adhesive off with a disposable rag to ensure no mixed adhesive remains on the dispense gun. Dispose of the rag in the purge bucket.

***Ratio Test** (contd.)*

6. Place containers A and B under the dispense gun so that the major material will flow into container A and the minor material will flow into container B.

7. Purge the major and minor material from the robot into the containers. Make sure that the major material goes into container A and the minor material goes into container B.

8. Set the purge timer so the metering unit travels its full stroke.

9. Weigh container A to the nearest 0.1 gram. Record the weight of container A on line 2 of the worksheet.

10. Weigh container B to the nearest 0.1 gram. Record the weight of container B on line 2 of the worksheet.

11. Dispose of containers A and B in the purge bucket.

12. For container A, subtract line 1 from line 2. Enter the result on line 3.

13. For container B, subtract line 1 from line 2. Enter the result on line 3.

14. Using the figures on line 3, divide A (major) by B (minor). This is the mix ratio.

NOTE: The mix ratio should be between the range specified by the material supplier. If it is not within these limits, repeat the ratio check. If the results are still not within these limits, notify your supervisor.

NOTE: The following page contains a *Two-Component Epoxy Ratio Worksheet.* Make copies of this page to use each time you perform a ratio test.

Two-Component Epoxy Ratio Test Worksheet

Operator name: _____

Date: _____ Shift: _____ Operation Number: _____

1. Material Temperature (controlled by the Temperature Conditioning System)

   Metering Unit— _____°F

   Dispense Gun—_____°F

2. Is purge bucket empty? Yes_____ No_____ (if no, then empty)

3. Epoxy Ratio Test:

	Major (A)	Minor (B)
1. Empty container weight		
2. Container and sample weight		
3. Net weight of sample (#2 – #1)		
4. Major (A) divided by Minor (B) = Mix Ratio		

Operator Signature: _____

6. Maintenance

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

Follow a preventative maintenance schedule to keep your two-component metering system operating efficiently.

	Each Shift or As Needed	Daily	Weekly	Monthly	Yearly
DISPENSE GUN					
Perform Mix Ratio Test	**X**				
Replace nozzle	**X**				
Install clean mixture tube	**X**				
Clean gun nose		**X**			
Check air lines and material hoses for leaks or damage. Replace lines and hoses as necessary.	**X**				
Check the nozzle for wear. Replace the nozzle as needed.		**X**			
Check the nozzle for leaks. Clean the nozzle when necessary.		**X**			
Check the dispense gun for response speed. If the gun responds too slowly, adjust the air pressure to the solenoid or replace the packing cartridge.		**X**			
Check the gun body for leaks through the weep hole. If leaks occur, replace the packing cartridge.		**X**			
DRUM UNLOADERS					
Check pump air pressure			**X**		
Check Ram pressure		**X**			
Check pump solvent cup fluid level			**X**		
Check material filter			**X**	**X**	
Grease follower plate seals	Every drum change				
TEMPERATURE CONDITIONING					
Check temperature setting/reading			**X**		
Check water level				**X**	
Add rust inhibitor					**X**
Clean Y–strainer					**X**
MISCELLANEOUS					
Check epoxy expiration date			**X**		
Check for water and material leaks		**X**			
Check for hose and cable wear			**X**		
Check lamps at dispense controller, temperature controller, unloader beacon			**X**		

7. Troubleshooting

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

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

	Problem	Page
1.	Bead too small	26
2.	LOW VOLUME alarm	26
3.	Bead too large	26
4.	HIGH VOLUME alarm	27
5.	No material comes out of the mixer tube	27
6.	No refill	28
7.	Leaking through valve weep hole	28

Troubleshooting Chart

Use the following chart to troubleshoot any difficulties encountered during the operation of the two-component metering Unit. Any fault or error messages from the system controller are indicated in all capital letters.

NOTE: At the end of this section, see Figure 9 for a meter pneumatic schematic and Figure 10 for a meter electrical schematic.

Problem	Possible Cause	Corrective Action
1. Bead too small	Nozzle bent	Replace the disposable mixer tube.
	Mixer tube clogged	Replace the disposable mixer tube.
	UNDERTEMPERATURE ALARM — (temperature conditioning system) — Material temperature too low	Check the temperature conditioning system and reset as necessary.
	AIR MOTOR REGULATOR GAUGE — Low air pressure to drive cylinder	Check all incoming supply pressures.
	Kinked air line to drive cylinder	Visually inspect all air hoses for kinks. Replace any kinked hoses.
	LOW VOLUME FAULT — Kinked material hose	Visually inspect all material hoses for kinks or restrictions. Replace any kinked or blocked hoses.
2. LOW VOLUME alarm	Drive pressure too low	Readjust the pressure.
	Plugged mixer tube	Replace the disposable mixer tube
3. Bead too large	Mixer tube tip missing	Replace the disposable mixer tube.
	HIGH TEMPERATURE ALARM (temperature conditioning system) — Material temperature too high	Check the temperature conditioning system temperature setting and reset as necessary.
	No mixer tube in shroud	Install the shroud and mixer tube to the dispense gun. Purge the gun to fill the tube with material.

Problem	Possible Cause	Corrective Action
4. HIGH VOLUME alarm	Drive pressure too high	Readjust the pressure.
5. No material comes out of the mixer tube	No gun-on signal from robot	Check an/or correct signal sequence and timing from robot.
	No part strobe	Check an/or correct signal sequence and timing from robot.
	Plugged mixer tube	Replace the disposable mixer tube.
	Broken metering assembly control cable	Replace the metering valve cable.
	Valve sticking, bad valve, or bad solenoid	1. Remove the shroud and disposable mixer tube. Turn the PURGE key located inside the PLC cabinet. Watch the dispense gun for meter flow. If the major metering valve is opening, then the blockage is on the minor side. 2. Turn the BLEED key located inside the PLC cabinet. Bleed the major side and the minor side separately. Determine which side will not open. 3. Check the solenoid LEDs for signal from the PLC. 4. Remove white (open) air from the major and minor sides separately. Turn the BLEED key. If air rushes out of the valve, the valve is bad. If little or no air leaks from the valve, the solenoid is bad.

Troubleshooting Chart *(contd.)*

Problem	Possible Cause	Corrective Action
6. No refill	Ball valve on pumps closed	Check the material supply system to make sure that all valves are open. Open any valves necessary for dispensing.
	Missing or insufficient air pressure to unloader pumps	Turn on air pressure to the unloader pumps. Turn up the air pressure if pressure is already on. If the pressure is already at the maximum, then the material line is blocked.
	No material in drum	Change the material drum at the unloader.
	Kinked or broken hoses between pumps and metering unit	Visually inspect all hoses. Replace any broke, leaking, or kinked hoses.
	Filter behind the unloader plugged	Replace the filter.
	LOW DRIVE CYLINDER LIGHT — High friction in packing glands of metering cylinder	Raise the metering cylinder pressure. If pressure to the metering cylinders has reached the maximum allowed, replace the metering cylinders.
7. Leaking through valve weep hole	Worn packing cartridge in the inlet/outlet valves	Replace the packing cartridge in the valve where the leak occurs.

Schematics

Use Figure 9 and Figure 10 for reference.

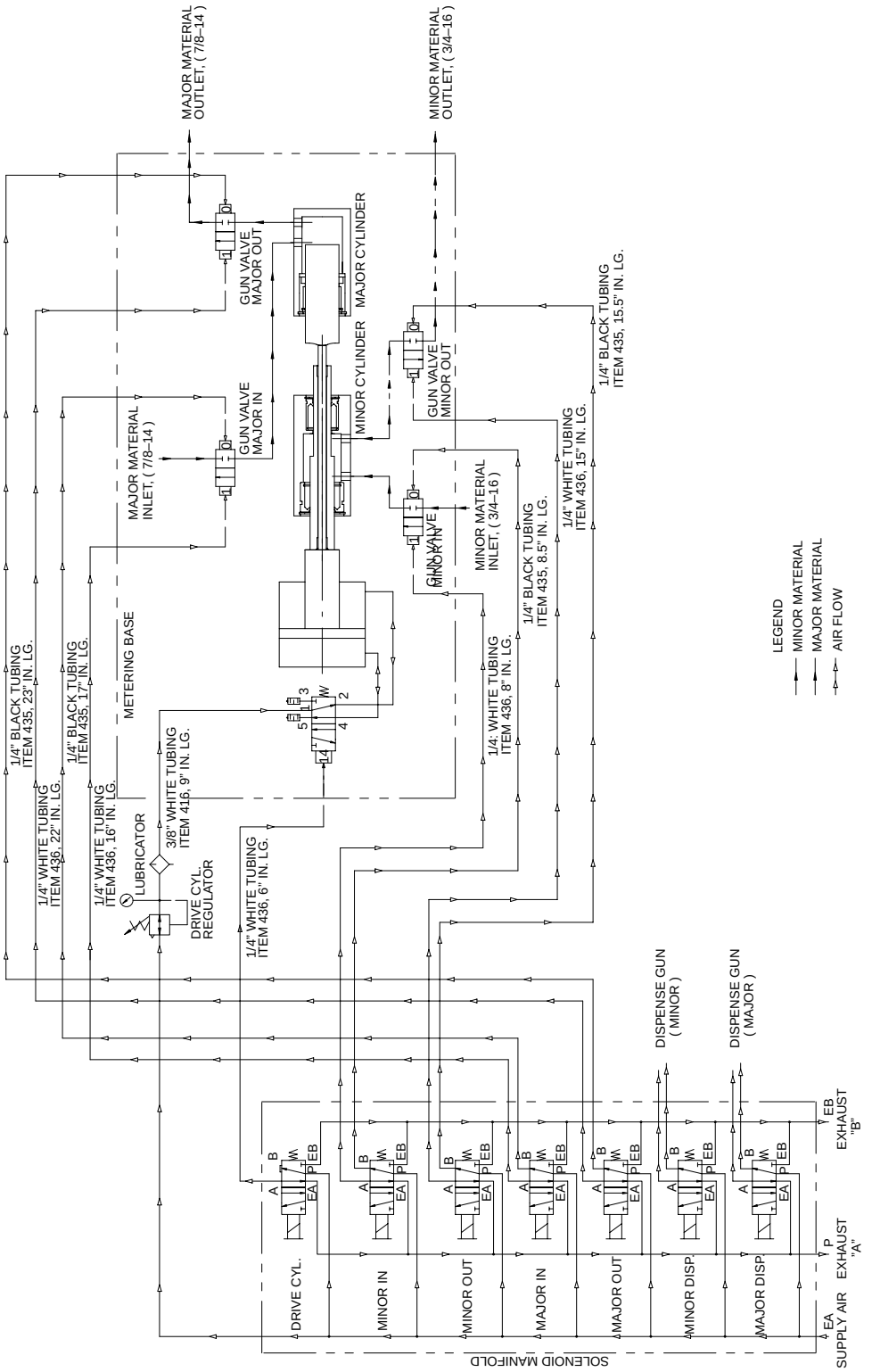


Fig. 9 Meter Pneumatic Schematic

Schematics *(contd.)*

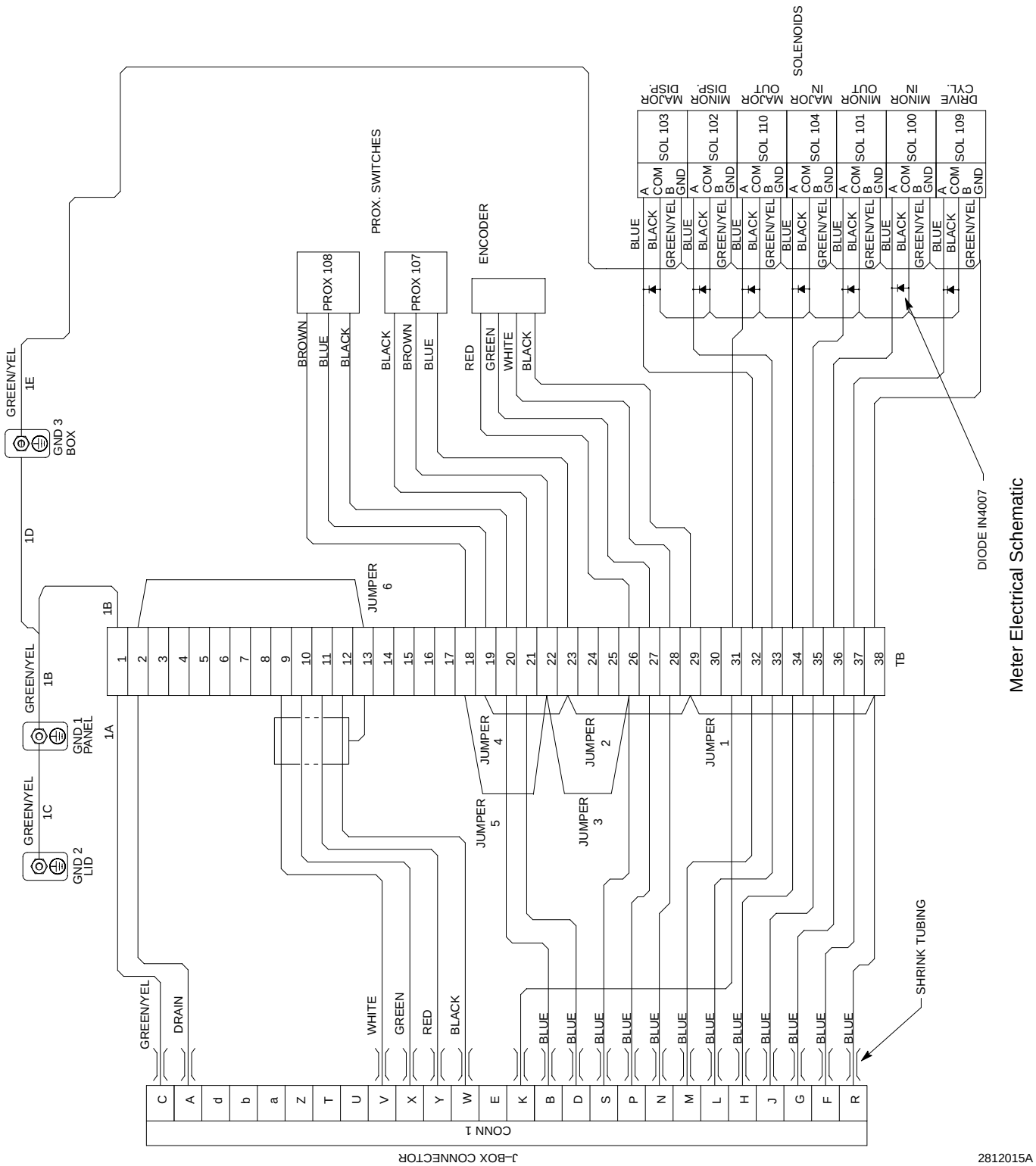


Fig. 10 Meter Electrical Schematic

8. Repair

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

Following are the instructions for removing the major and minor metering cylinders and the inlet/outlet valves.

Metering Cylinders

NOTE: Before performing any repairs, bleed the pressure from the system. Close the material supply. Use the bleed setting to evacuate the meter.

Before removing either metering cylinder, you must make sure that all the pressures are bled off. Verify that the controller is powered down and that none of the solenoid valves are active. You should be able to take full manual control of the solenoids. The PLC should not be powered up.

Major Metering Cylinder

The major cylinder is not field repairable. Send it to Nordson Corporation for servicing.

See Figure 11.

NOTE: With the minor bleed valve open, you should be able to move the push rod out of the way to remove the major metering cylinder.

1. Using a $^{5}/_{16}$ allen key, remove the three socket head cap screws (1) securing the major metering cylinder (2) to the manifold (3).
2. Lift the cylinder straight up, being careful not to catch the cylinder on the alignment pins.
3. Clean the top of the manifold base plate with a compatible cleaning agent or solvent.
4. Lubricate the O-rings with synthetic oil. Install two new O-rings to the underside of the major metering cylinder.
5. Install the new major cylinder over the alignment pins. Make sure that the O-rings do not drop out of their grooves or slip out of alignment.
6. Tighten the three socket head cap screws alternately until they are hand tight. Tighten the screws to 61 N•m (45 lb/ft).

***Major Metering Cylinder** (contd.)*

7. Prime the cylinder:

   a. Bleed the system to displace any air from the cylinders.

   b. Pressurize the system with material.

   c. Turn the corresponding bleed key switch or menu selection and hold for 10 seconds to bleed material out of the meter.

8. Perform a system test:

   a. Remove and discard the mixer tube from the dispense valve.

   b. Purge the material several times and inspect that the material is dispensed from both gun openings.

   c. Inspect for material leakage.

   d. Inspect for water leakage.

   e. Inspect for air leakage.

   f. Perform a ratio test to ensure proper ratio.

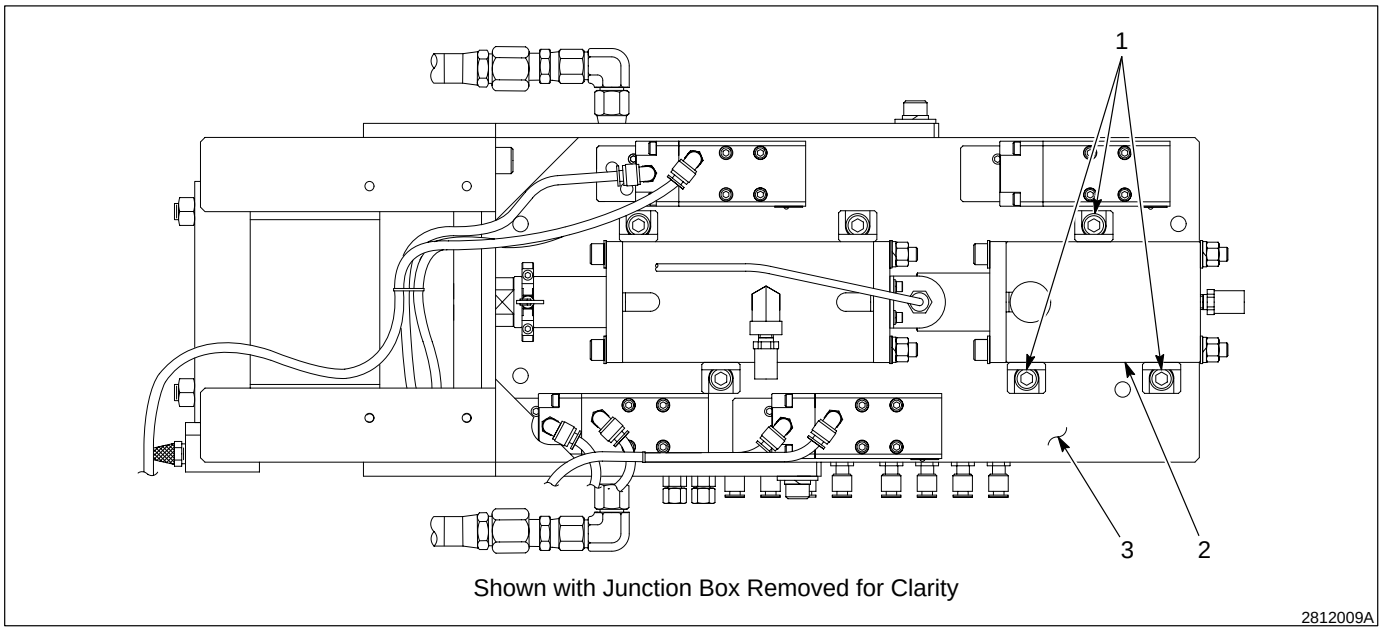


Fig. 11 Replace Major Metering Cylinder

1. Socket head cap screws
2. Major metering cylinder
3. Manifold

Minor Metering Cylinder

The minor cylinder is not field repairable. Send it to Nordson Corporation for servicing.

See Figure 12.

1. Remove the two 10-32 screws and remove the bracket with the major proximity switch attached. Set the bracket and switch aside.

2. Carefully unhook the flowmeter encoder cable (4) from the encoder rod (1).

CAUTION: Be careful not to let the spring-loaded encoder cable snap back towards the encoder. You could severely damage the encoder.

3. Slowly let the cable feed back into the encoder (6) until all of the slack is taken up.

4. Remove the major cylinder proximity switch (7) from the minor metering cylinder (2).

5. Using a $^{5}/_{16}$ allen key, remove the three socket head cap screws (3) that fix the minor metering cylinder to the manifold (5).

6. Lift the cylinder straight up, being careful not to catch the cylinder on the alignment pins. Do not let the push rod slip out of the plunger.

7. Remove the encoder rod.

8. Install the old encoder rod onto the new cylinder plunger.

9. Clean the top of the manifold base plate with a compatible agent or solvent.

10. Lubricate the O-rings with synthetic oil. Install two new O-rings to the underside of the minor metering cylinder.

11. Insert the push rod back into the plunger.

12. Install the new minor cylinder over the alignment pins. Make sure that the O-rings do not drop out of their grooves or slip out of alignment. Tighten the three socket head cap screws alternately until they are hand tight. Tighten the screws to 61 N•m (45 lb/ft).

Minor Metering Cylinder *(contd.)*

13. Install the proximity switch by bolting the bracket to the metering cylinder using the two 10-32 screws.

CAUTION: Failure to adjust the proximity switch could result in damage to the switch and the metering unit assembly or prevent metering unit operation.

14. Loosen the nuts on the top and bottom side of the proximity switch. Once you have determined the range of the major metering cylinder plunger, adjust the proximity switch and tighten the nut.

15. Attach the flowmeter encoder cable to the clamp on the minor metering cylinder.

16. Prime the cylinder:

    a. Bleed the system to displace any air from the cylinders.

    b. Pressurize the system with material.

    c. Turn the corresponding bleed key switch or menu selection and hold for 10 seconds to bleed material out of the meter.

17. Perform a system test:

    a. Remove and discard the mixer tube from the dispense valve.

    b. Purge the material several times and inspect that the material is dispensed from both gun openings.

    c. Inspect for material leakage.

    d. Inspect for water leakage.

    e. Inspect for air leakage.

    f. Perform a ratio test to ensure proper ratio.

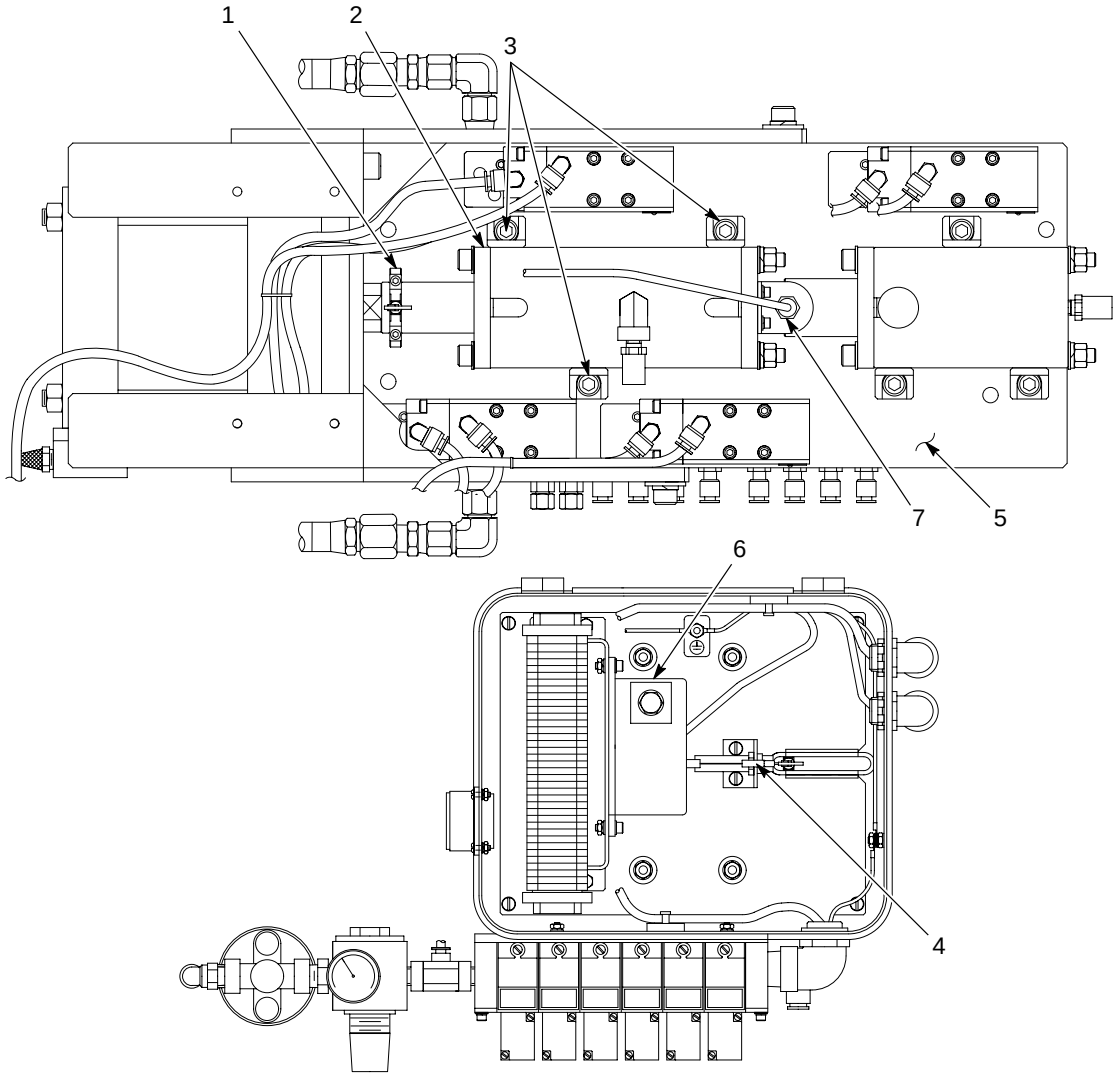


Fig. 12 Replace Minor Metering Cylinder

1. Encoder rod
2. Minor metering cylinder
3. Socket head cap screws
4. Flowmeter encoder cable
5. Manifold
6. Encoder
7. Proximity switch — major cylinder

Inlet/Outlet Valve

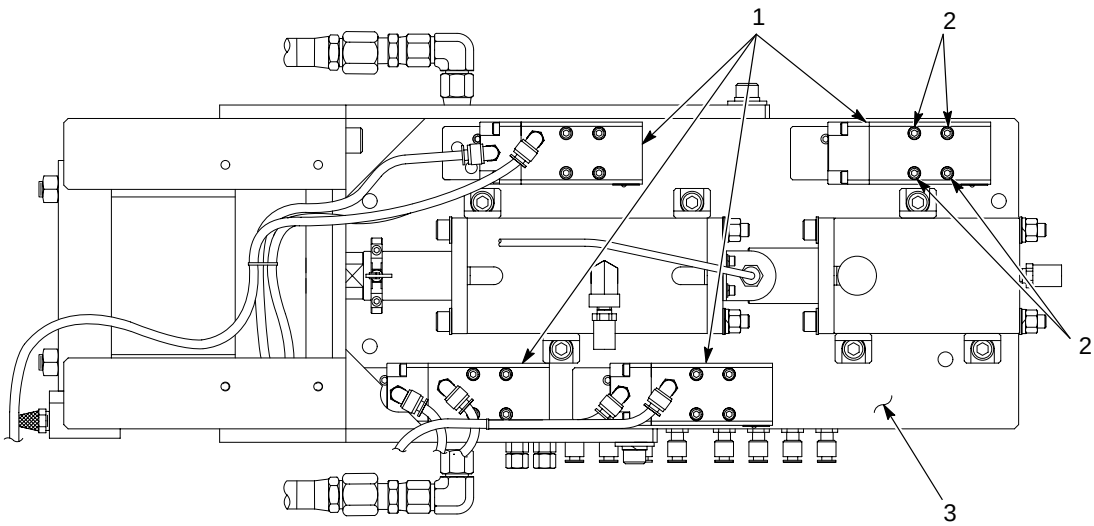
1. Shut off the drum unloader.
2. Purge the inlet/outlet valve to relieve the pressure in the hose and valve.
3. Shut off and lock-out all power to the system.

See Figure 13.

CAUTION: Make sure that all pressure has been relieved on either side of the valve before removing it from the manifold.

NOTE: Do not remove the small plate on the valve when you remove the valve from the fixture.

4. Remove the valve (1) by unscrewing the four socket head cap screws (2) that secure it to the manifold (3).
5. Replace and lubricate all O-rings.
6. Make sure that the air passages on the manifold are clear of any material or dirt.
7. Install the new valve onto the manifold, being careful not to pinch any O-rings.
8. Tighten the four socket head cap screws to 5.5 N•m (51 lb/in.).
9. Install all air lines for opening and closing the valve.
10. Perform a bleed test.
11. Perform a system test:
    a. Remove and discard the mixer tube from the dispense valve.
    b. Purge the material several times and inspect that the material is dispensed from both gun openings.
    c. Inspect for material leakage.
    d. Inspect for water leakage.
    e. Inspect for air leakage.
    f. Perform a ratio test to ensure proper ratio.



Shown with Junction Box Removed for Clarity

2812011A

Fig. 13 Replace Inlet/Outlet Valve

1. Inlet/outlet valve
2. Socket head cap screws
3. Manifold

Dispense Gun Packing Cartridge

NOTE: To prevent mixing components, do not replace the packing cartridges in the major side and the minor side at the same time.

NOTE: The stainless steel gun and the aluminum gun use different types of cartridges based on the type of material used. If you are unsure about which replacement cartridge to use, contact your Nordson representative.

See Figure 14.

1. Remove the screws (1) and washers (2) from the air cylinder cap (3).
2. Remove the air cylinder cap.
3. Place a screwdriver (5) in each of the two slots on the sides of the packing cartridge (4).
4. Remove the packing cartridge.
5. Place the new packing cartridge in the appropriate side.
6. Install the air cylinder over the piston assembly.
7. Attach the cap with screws and washers.
8. Prime the dispense gun:
   a. Remove the plug from the gun body.
   b. Pressurize the dispensing system.
   c. Install the plug into the gun body.
9. Perform a system test:
   a. Remove and discard the mixer tube from the dispense valve.
   b. Purge the material several times and inspect that the material is dispensed from both gun openings.
   c. Inspect for material leakage.
   d. Inspect for water leakage.
   e. Inspect for air leakage.
   f. Perform a ratio test to ensure proper ratio.

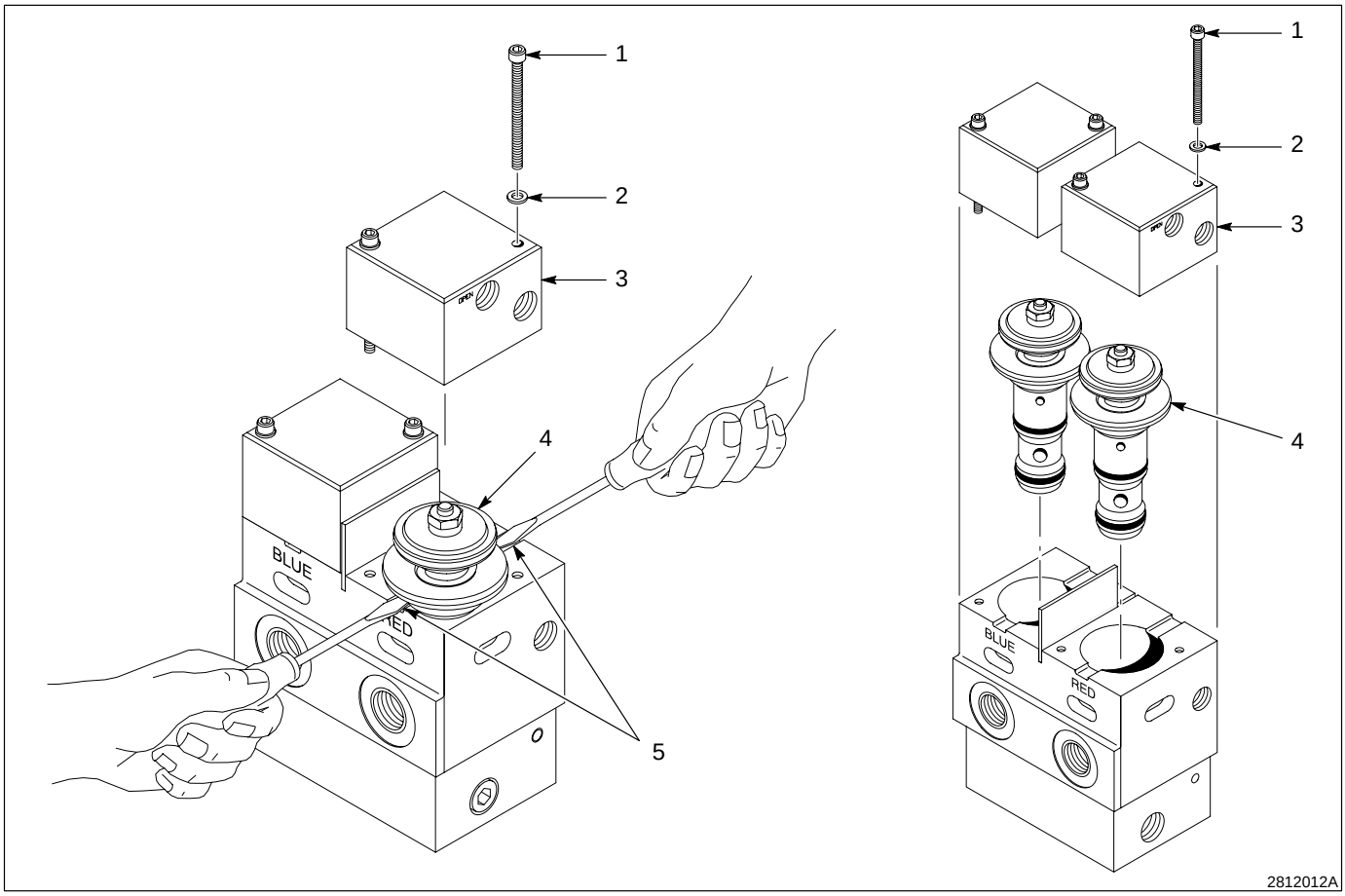


Fig. 14 Replace Dispense Gun Packing Cartridge

1. Screw
2. Washer
3. Air cylinder cap
4. Packing cartridge
5. Screwdriver

Inlet/Outlet Valve Packing Cartridge

See Figure 15.

1. Remove the screws (1) from the air cylinder cap (2).
2. Remove the air cylinder cap and spring (3).
3. Use a small screwdriver to pry the packing cartridge (4) from the valve body (6).
4. Remove the packing cartridge.
5. Place the new packing cartridge in the valve body.
6. Install the air cylinder cap and spring over the piston assembly.
7. Attach the cap with screws.
8. Prime the inlet/outlet valve.
9. Perform a system test:
   a. Remove and discard the mixer tube from the dispense valve.
   b. Purge the material several times and inspect that the material is dispensed from both gun openings.
   c. Inspect for material leakage.
   d. Inspect for water leakage.
   e. Inspect for air leakage.
   f. Perform a ratio test to ensure proper ratio.

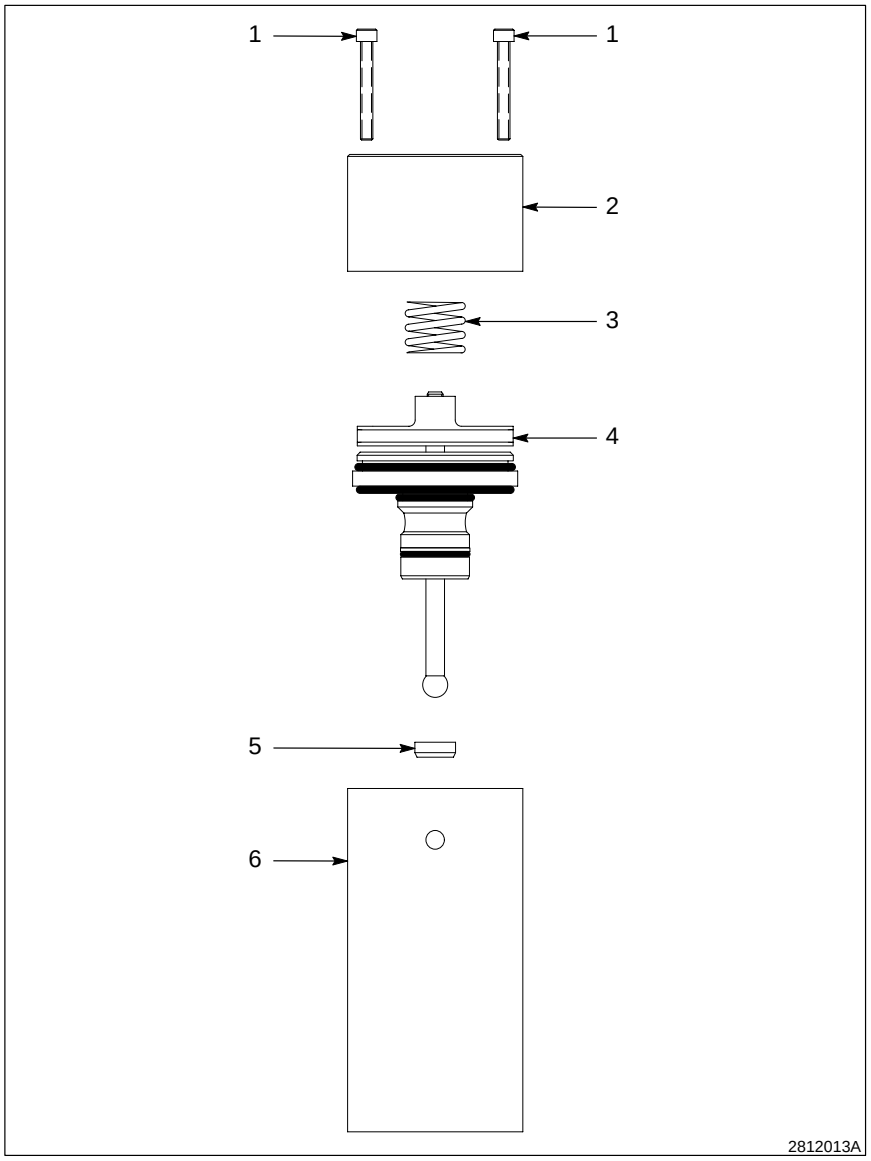


Fig. 15 Replace Inlet/Outlet Valve Packing Cartridge

1. Socket head cap screw
2. Air cylinder cap
3. Spring
4. Packing cartridge
5. Carbide seat
6. Inlet/outlet valve

9. Recommended Spare Parts

Keep these parts on hand to reduce down time.

Metering Unit

See Figure 16.

Item	Part	Description	Quantity	Note
1	186 678	Encoder, 2K metering assembly	1	
4	271 484	Cylinder drain valve	1	
5	186 667	Proximity sensor, 2K metering	1	
6	186 669	Solenoid valve pak, 6, 24V	1	

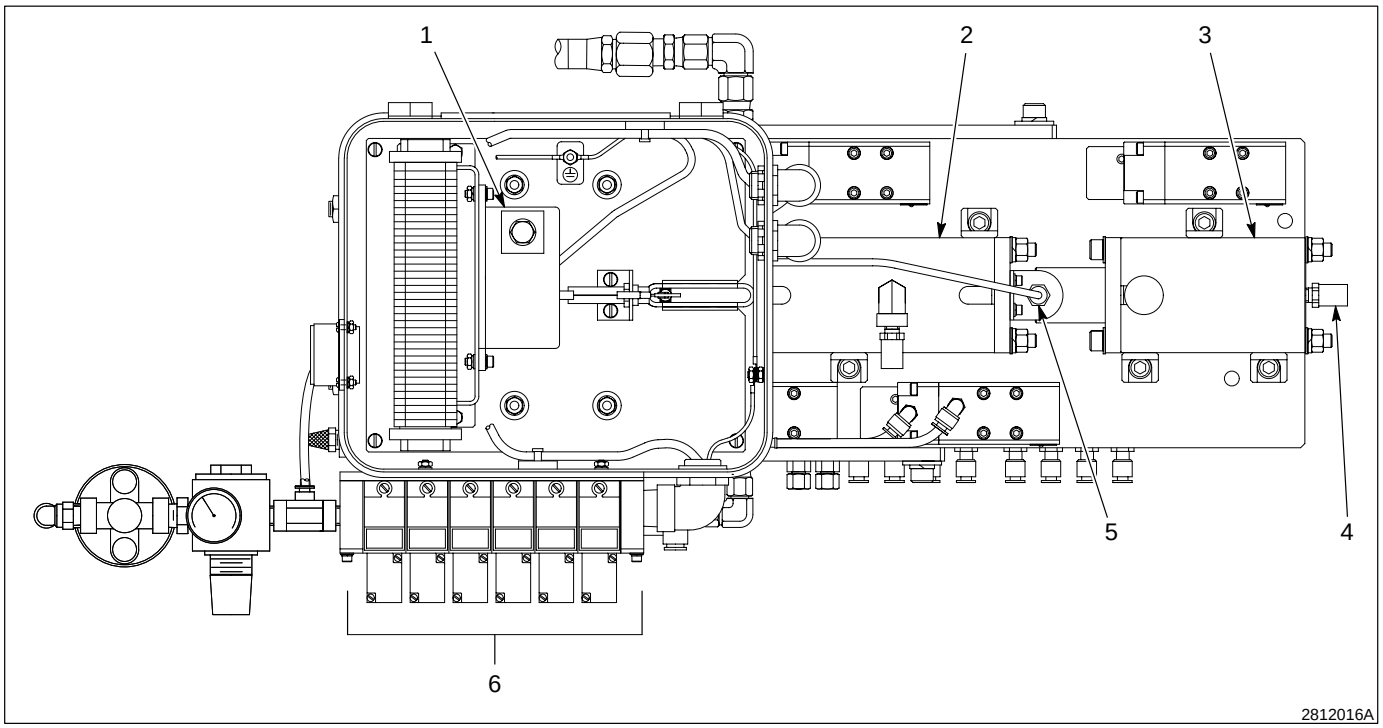


Fig. 16 Metering Unit

Dispense Gun

See Figure 17.

Part	Description	Quantity
173 000	2K dispense gun, aluminum	1
173 001	2K dispense gun, stainless steel	1

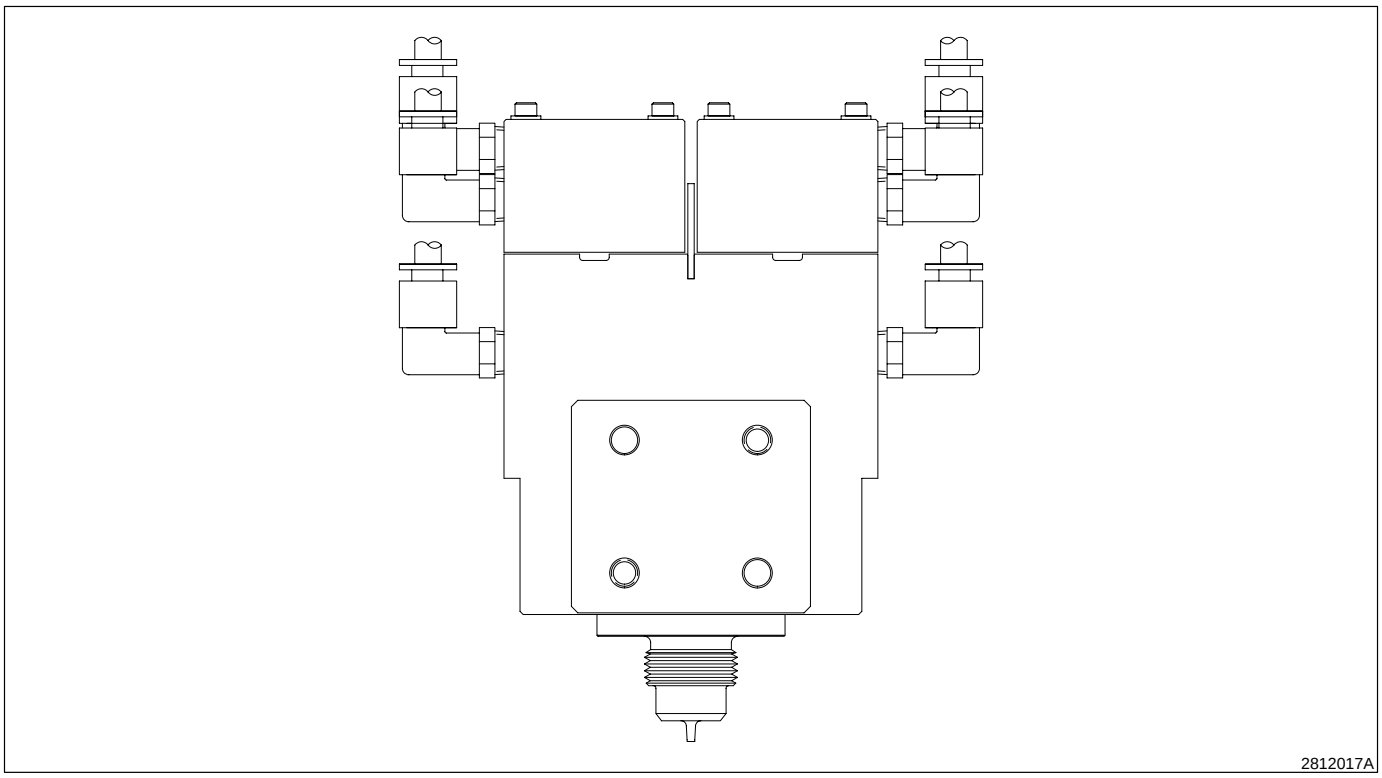


Fig. 17 Dispense Gun

Inlet/Outlet Valve

See Figure 18.

Part	Description	Quantity
238 336	Gun, valve, aluminum w/polymite	1
238 337	Gun, valve, aluminum w/UHMW	1
238 338	Gun, valve, stainless steel w/polymite	1

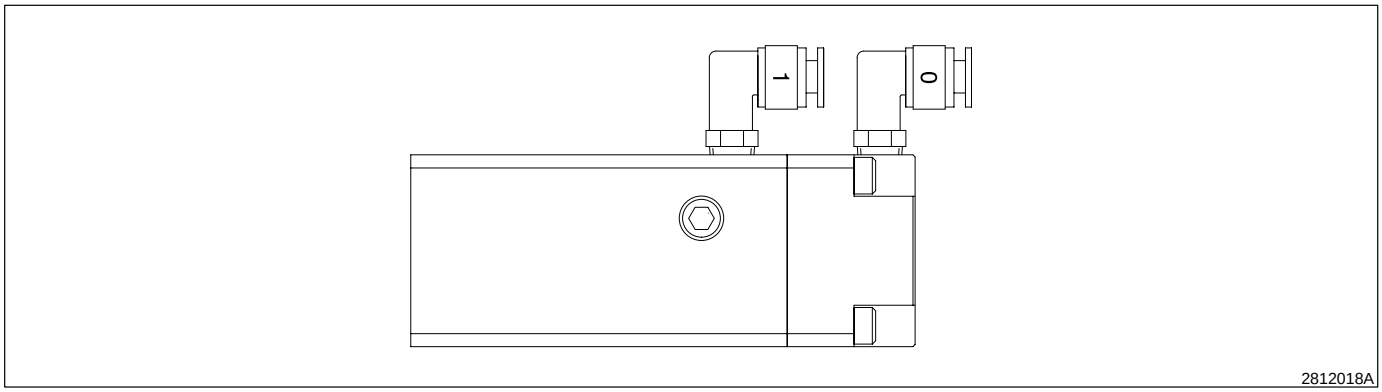


Fig. 18 Inlet/Outlet Valve

Metering Unit Service Kits

See Figure 16.

Item	Part	Description	Quantity	Note
2	296 418	Kit, cylinder, minor 1:1	1	
3	296 419	Kit, cylinder, major 1:1	1	
NS	180 221	Kit, cylinder, assembly, major 7.4:1 and 2:1 and 4:1	1	
NS	180 225	Kit, cylinder, assembly, minor 2:1	1	
NS	228 420	Kit, cylinder, assembly, major ARW 4:1, stainless steel	1	
NS	228 423	Kit, cylinder, assembly, minor 4:1, stainless steel	1	
NS	186 681	Solenoid valve service kit	1	A

NOTE A: Use with solenoid valve pak, part 186 669.
NS: Not Shown

Dispense Gun Service Kits

Item	Part	Description	Quantity	Note
NS	239 702	Seal cartridge, blue, major material, aluminum	1	A
NS	239 701	Seal cartridge, red, minor material, aluminum	1	A
NS	296 528	Service kit, cartridge, carbide, stainless steel	1	B

NOTE A: Use with dispense gun, part 173 000.
B: Use with dispense gun, part 173 001.
NS: Not Shown

Inlet/Outlet Valve Service Kits

Item	Part	Description	Quantity	Note
NS	239 788	Kit, cartridge & piston, aluminum, polymite	1	A
NS	238 345	Kit, cartridge & piston, aluminum, UHMW-PE	1	B
NS	238 347	Kit, cartridge & piston, stainless steel, polymite	1	C

NOTE A: Use with inlet/outlet valve, part 238 336.
B: Use with inlet/outlet valve, part 238 337.
C: Use with inlet/outlet valve, part 238 338.
NS: Not Shown