Compact Manual Iso-Flo®
Voltage-Block System

Part 108390B

For parts and technical support, call the Industrial Coating
Systems Customer Support Center at (800) 433-9319 or
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Section 1

Safety
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Safety

1. Introduction

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

To use this equipment safely,

- read and become familiar with the general safety instructions provided in this section of the manual before installing, operating, maintaining, or repairing this equipment.

- read and carefully follow the instructions given throughout this manual for performing specific tasks and working with specific equipment.

- store this manual within easy reach of personnel installing, operating, maintaining, or repairing this equipment.

- follow all applicable safety procedures required by your company, industry standards, and government or other regulatory agencies. Refer to the National Fire Protection Association (NFPA) standard 33 and to federal, state, regulatory agency, and local codes for rules and regulations covering installation and operation of spray systems.

- obtain and read Material Safety Data Sheets (MSDS) for all materials used.

2. Safety Symbols

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

**WARNING:** Failure to observe this warning may result in personal injury, death, or equipment damage.
2. **Safety Symbols** *(contd.)*

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

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

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

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

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

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

**WARNING:** Injection. Do not point this device at yourself or other personnel. Failure to observe this warning may result in serious injury or death.
2. Safety Symbols (contd.)

CAUTION: Failure to observe may result in equipment damage.

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

3. Qualified Personnel

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

4. Intended Use

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

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

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

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

**WARNING:** Failure to follow these safety procedures can result in personal injury or death.

- Allow only qualified personnel to install Nordson equipment.
- Use only approved equipment. Using unapproved equipment in an approved system may void agency approvals.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Follow all instructions for installing components and accessories.
- Install all electrical, pneumatic, gas, and hydraulic connections to local code.
- Install locking, manual, shutoff valves in the air supply lines to the system. This allows you to relieve air pressure and lock out the pneumatic system before undertaking maintenance and repairs.
- Install a locking disconnect switch or breaker in the service line ahead of any electrical equipment.
- Use only electrical wire of sufficient gauge and insulation to handle the rated current demand. All wiring must meet local codes.
- Install locking, manual, shutoff valves in the air supply lines to the system. This allows you to relieve air pressure and lock out the pneumatic system before undertaking maintenance and repairs.
- Install safety interlocks and approved, fast-acting fire detection systems. These shut down the spray system and any flammable liquid supply if a ventilation or electrical problem occurs, a fire is detected, or other emergency situation develops.
5. **Installation (contd.)**

- Make sure the spray area floor is conductive to ground and that the operator’s platform is grounded.

- Use only designated lifting points or lugs to lift and move heavy equipment. Always balance and block loads when lifting to prevent shifting. Lifting devices must be inspected, certified, and rated for a greater weight than the equipment being lifted.

- Do not use unapproved fluid hoses. Solvents may cause them to deteriorate rapidly which may allow flammable or pressurized material to escape.

- Protect components from damage, wear, and harsh environmental conditions.

- Allow ample room for maintenance, material supply container drop-off and loading, panel accessibility, and cover removal.

- Protect equipment with safety devices as specified by applicable safety regulations.

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

6. **Operation**

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

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

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

- Before starting this equipment, check all safety interlocks, fire-detection systems, and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the system if these devices are not working properly. Do not deactivate or bypass automatic safety interlocks, locked-out electrical disconnects, or pneumatic valves.
Know where **EMERGENCY STOP** buttons, shutoff valves, and fire extinguishers are located. Make sure they work. If a component malfunctions, shut down and lock out the equipment immediately.

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

Never operate equipment with a known malfunction or leak.

Never point handguns or applicator nozzles at yourself or other persons.

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

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

Shut off moving equipment before taking measurements or inspecting workpieces.

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

Wear shoes with conductive soles, such as leather, or use grounding straps to maintain a connection to ground when working with or around electrostatic equipment.

Do not wear or carry metallic objects (jewelry or tools) while working with or around electrostatic equipment. Ungrounded metal can store a static charge and cause harmful shocks.

Maintain skin-to-metal contact between your hand and the gun handle to prevent shocks while operating manual electrostatic spray guns. If wearing gloves, cut away the palm or fingers.

Shut off electrostatic power supplies and ground gun electrodes before making adjustments to powder spray guns.

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

Keep parts of the body or loose clothing away from rotating parts. Remove personal jewelry and cover or tie back long hair.
6. **Operation (contd.)**

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

- Wear eye protection when operating spray equipment.

- Wear gloves and protective clothing to protect your skin from materials.

- Keep paint pumps, pressure pots, and containers of flammable coating materials or solvents far enough away from spray booths to prevent their inclusion in a booth fire.

- Do not smoke in the spray area. A lit cigarette could ignite a fire or cause an explosion.

- Treat all high-pressure fittings and hoses as if they could leak. High-pressure compressed air can be injected under the skin and cause serious injury or death.

- Do not use materials that will corrode the equipment.

- Do not attempt to operate electrical equipment if standing water is present.

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

7. **Less-Obvious Dangers**

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

- exposed surfaces on the equipment which may be hot or have sharp edges and cannot be practically safeguarded

- electrical equipment which may remain energized after the equipment has been shut off

- vapors and materials which may cause allergic reactions or other health problems

- automatic hydraulic, pneumatic equipment, or mechanical parts that may move without warning

- unguarded, moving mechanical assemblies
8. **Action in the Event of a System or Component Malfunction**

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

- Disconnect and lock out electrical power. Close and lock out hydraulic and pneumatic shutoff valves and relieve pressures.
- Allow only qualified personnel to make repairs. Repair or replace the malfunctioning component according to instructions provided in its manual.

9. **Maintenance and Repair**

Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks. Only persons who are properly trained and familiar with Nordson equipment are permitted to service this equipment.

- Always wear appropriate protective clothing and use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in your equipment manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Disconnect, lock out, and tag electrical power at a disconnect or breaker in the service line ahead of electrical equipment before servicing.
- Relieve air and fluid pressures before servicing equipment. Follow the specific instructions in this manual.
- Use only genuine Nordson replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.

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

- Refer to the MSDS before using solvents to clean this equipment. The MSDS will provide use, storage, and disposal information about the solvent. Read this information carefully and follow instructions.
9. **Maintenance and Repair**  
(contd.)

- Never use an open flame to clean the unit or components of the unit.

- Do not store flammable materials in the spray area or room. Keep paint pumps, pressure pots, and containers of flammable coating materials or solvents far enough away from spray booths to prevent their inclusion in a booth fire. If a fire or explosion occurs, flammable materials in the area will increase the chances and the extent of personal injuries and property damage.

- Make sure that the room where you are working is sufficiently ventilated. Avoid breathing vapors over prolonged periods of time.

- Check interlock systems periodically to ensure their effectiveness.

**WARNING:** Operating faulty or electrostatic equipment is hazardous and can cause electrocution, fire, or explosion. Make resistance checks part of your periodic maintenance program.

- Check all ground connections periodically with a megohm meter. Resistance to ground must not exceed one megohm. If sparks or arcing occur, shut down the system immediately.

- Connect all disconnected equipment ground cables and wires after servicing the equipment. Ground all conductive equipment.

**WARNING:** Service lines connected to panel disconnect switches will still be energized unless power is shut off at another disconnect ahead of the panel. Make sure the power is off before servicing. Wait 5 minutes for capacitors to discharge after shutting off the electrical power.

- Turn off the electrostatic power supply and ground the gun electrode before adjusting or cleaning the nozzles, fluid tips, or air caps.

- If a “power on” test is required, perform the test carefully and then shut off and lock out power as soon as the test is over.

- Never troubleshoot the power supply without first disconnecting all external power supplies and discharging the high-voltage capacitors with an insulated screwdriver.

- Ground electrodes and electrostatic cable ends before touching them.
9. Maintenance and Repair
(contd.)

- Do not attempt to service electrical equipment if there is standing water present. Do not service electrical equipment in a high-humidity environment.

- Use tools with insulated handles when working with electrical equipment.

- Keep high-voltage connection points clean and insulated with dielectric grease or oil.

- Do not attempt to service a moving piece of equipment. Shut off the equipment and lock out power. Secure equipment to prevent uncontrolled movement.

10. Material and Solvent Precautions

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

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

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

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

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

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

To prevent an injection injury, take some basic safety precautions when operating your equipment.

- Always handle spray applicators carefully. Do not point a pressurized gun at yourself or other personnel.
- Never place hands, fingers, or other parts of your body directly over a spray nozzle or in front of a leak in a high-pressure system.
- Never “back-flush” the nozzles. Blocking a nozzle causes the high-pressure fluid to reverse direction and can lead to an injection injury.
- Always relieve system pressure before servicing equipment. Trigger all applicators and bleed off system pressure.

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

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

- Use nonhalogenated solvents.
- Contact your solvent supplier to determine whether your existing materials and solvents contain halogenated hydrocarbons or to obtain a suitable, nonhalogenated hydrocarbon solvent for cleaning and flushing your system.
10. Material and Solvent Precautions (contd.)

- See Table 1-1. Check the labels on your solvent containers. Halogenated hydrocarbon solvents can be recognized if any of the following elements are listed in the name of the product or as an ingredient:

<table>
<thead>
<tr>
<th>Element</th>
<th>Symbol</th>
<th>Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorine</td>
<td>F</td>
<td>“Flouro-”</td>
</tr>
<tr>
<td>Chlorine</td>
<td>Cl</td>
<td>“Chloro-”</td>
</tr>
<tr>
<td>Bromine</td>
<td>Br</td>
<td>“Bromo-”</td>
</tr>
<tr>
<td>Iodine</td>
<td>I</td>
<td>“Iodo-”</td>
</tr>
</tbody>
</table>

If you are now using halogenated hydrocarbon solvents in pressurized systems with aluminum components, perform the following steps:

- Pump the system empty, shut off the pumps, and relieve the system pressure.

- Disassemble and inspect the system components. Replace any damaged or corroded parts.

- Thoroughly clean all noncorroded parts with nonhalogenated hydrocarbon.

- Contact your coatings, solvent, or adhesive supplier for a nonhalogenated solvent to thoroughly flush the entire system before operating it.

- If you must continue to use halogenated hydrocarbon solvents, consult your Nordson representative about compatible Nordson components.
### Table 1-1 Solvents Containing Halogenated Fluids

<table>
<thead>
<tr>
<th>Chlorinated Solvents</th>
<th>Iodinated Solvents</th>
<th>Brominated Solvents</th>
<th>Fluorocarbon Solvents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Tetrachloride</td>
<td>Ethyl Iodide</td>
<td>Ethylene Dibromide</td>
<td>Dichlorofluoromethane</td>
</tr>
<tr>
<td>Chloroform</td>
<td>Methyl Iodide</td>
<td>Methyl Bromide</td>
<td>Trichlorofluoromethane</td>
</tr>
<tr>
<td>Ethylene Dichloride</td>
<td>N-butyl Iodide</td>
<td>Methylene Chlorobromide</td>
<td>Freon</td>
</tr>
<tr>
<td>Methylene Chloride</td>
<td>Propyl Iodide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-1-1 Trichloroethane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monochlorobenzene</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orthodichlorobenzene</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perchloroethylene</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 11. Disposal

Dispose of equipment and materials used in operation and cleaning according to your local regulations.
Section 2

Description
Section 2
Description

1. Introduction
The Compact Manual Iso-Flo Voltage-Block system is used in electrostatic waterborne coating systems equipped with air spray devices. While the operator is spraying, the Iso-Flo system:

- delivers pressurized coating material to the system on demand
- electrically isolates the charged spray device and fluid path from the grounded coating material supply

**WARNING:** Operating the system with more than one spray device connected to it may be unsafe and in possible violation of National Fire Prevention Association (NFPA) regulations. It also voids the warranty. If this occurs, Nordson Corporation will not be responsible for the performance or life of the system.

2. Description
The Compact Manual Iso-Flo system is installed between the coating material kitchen or supply pump and the spray device. This permits charged coating material to flow to the spray device, but blocks voltage from grounding at the kitchen or pump. The system can be mounted on a wall, free-standing panel, or dolly.

Coating material can be charged in one of three ways:

- at the spray device, with voltage supplied by an internal power supply (integral power supply (IPS) spray devices)
- at the spray device, with voltage supplied by a power supply through a cable to the device
- at the Iso-Flo system, with voltage supplied by a power supply through a cable to the Iso-Flo

The Iso-Flo system does not require electricity or external controls. Compressed air powers the Iso-Flo and it operates automatically in response to fluid flow.
The Iso-Flo system houses a pneumatically operated shuttle, pump, valves, and interconnecting lines. When the spray device is triggered, the shuttle opens and breaks the fluid connection to the supply. The pump pressurizes the coating material and delivers it to the spray device. The fluid path is electrostatically charged only from the shuttle to the spray device. When the spray device trigger is released, the shuttle closes and grounds the fluid path. Coating material flows through the shuttle couplings to refill the pump.

To prevent electrical shock, an interlock valve closes the shuttle and grounds the fluid path if the cabinet door is opened while the operator is spraying coating material. An air-operated fluid pressure regulator and an air pressure regulator inside the cabinet control the fluid pressure to the spray device.

Components

Figure 2-1 illustrates the components listed in the table. Table 2-1 lists the components and describes their function. Numbers in the table correspond to the callouts in the illustration.
Components (cont'd.)

Fig. 2-1 Internal view of the Iso-Flo system
## Components (contd.)

<table>
<thead>
<tr>
<th>Component</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Air regulator and gauge</td>
<td>Regulates and indicates pilot air pressure to the fluid pressure regulator. The pressure setting determines the fluid pressure to the spray device.</td>
</tr>
</tbody>
</table>
| 2. Flow sensor | Supplies and senses the flow of atomizing air to the spray device. Provides a pilot air signal to operate the shuttle.  
**NOTE:** The extra port in the housing for the air signal to close the pressure switch is optional. The customer-supplied pressure switch is wired to actuate the electrostatic power supply. |
| 3. Drain cock | Simulates atomizing air flow for testing the spray device nozzle flow rate, when opened. |
| 4. One-way check valve | Prevents two-way air from flowing through the line. |
| 5. Lubricator and sight glass | Mixes lubricant with working air to the pump. Lubricant prevents the pump seals from wearing prematurely and keeps the pump working smoothly. |
| 6. Iso-Flo pump | Supplies coating material to the spray device. Single-stage, air-operated, 1:1 fluid-to-air ratio. |
| 7. Fluid outlet | Connects the fluid hose to the spray device using a 3/8-in. NPSM male connector. |
| 8. Air-piloted fluid pressure regulator | Regulates the fluid pressure to the spray device. Controlled by an air regulator. |
| 9. Shuttle assembly | Makes or breaks the fluid connection to the spray device in response to a signal from the flow sensor. The shuttle’s pneumatic cylinder moves the female coupling and block up and down. |
| 10. Filter bowl | Removes lubricant from the pump exhaust air. |
| 11. Quick exhaust valve | Routes the working air from the lubricator into the pump on an air signal from the shuttle valve. Routes exhaust air from the pump into the filter. |
| 12. Toggle valve | Puts high air pressure on the pump air motor. |
| 13. Female coupling | Connects to the male coupling when the shuttle is closed to transfer coating material to pump. |
| 14. Male coupling | Connects to the female coupling when the shuttle is closed to transfer coating material to the pump. |
| 15. Door interlock valve | Prevents electrical shock. When the door is opened, this valve exhausts pilot air to the pilot valve, which closes the shuttle and grounds the fluid path. |
| 16. Shuttle valve | Connects the pilot valve to two separate and distinct operating signals. |
| 17. Fluid inlet | Connects to the coating material supply using a 3/8-in. NPT (F) connector. |
| 18. Pilot valve | Controls the air flow to the shuttle in response to a signal from the flow sensor or door interlock valve. |
| 19. Air inlet | Supplies compressed air using 1/4-in. NPT (F) connector. |
| 20. Ground strap (not illustrated) and clamp | Connects air inlet to ground. Clamp must be secured to a true earth ground. |
3. How the System Works

The Compact Manual Iso-Flo system is controlled by the trigger of the spray device. When the trigger is squeezed, the Iso-Flo system operates. When the trigger is released, the spray pump fills and the shuttles close, waiting for the next pull on the trigger. You do not need to make any special connections to the spray device, so any manufacturer’s electrostatic waterborne spray device will operate the Iso-Flo system.

Start Spraying

See Figure 2-2. The following occurs when the trigger is squeezed:

1. Squeezing the trigger (2) starts the flow of coating material and atomizing air.

2. The flow sensor (16) detects the flow of atomizing air and sends a separate air signal to the door interlock valve (11). If the cabinet door is closed, the air signal from the flow sensor passes through the door interlock valve to the pilot on the pilot valve (14).

3. The pilot valve (14) switches, causing compressed air from the atomizing air source to pass through the pilot valve, enter the coating material shuttle assembly (12), and force the shuttle down to the open position.

4. The compressed air passes through the shuttle valve (19) and the air release valve (6) to the air motor on the pump (5). This operates the pump’s air motor and pressurizes the coating material to the spray device (1).

Stop Spraying

Releasing the trigger momentarily does nothing until the time delay expires and the flow sensor stops sending air to the door valve. This relieves pressure to the pilot on the pilot valve, switching to its normal position.

1. In the normal position, compressed air passes to the bottom of the shuttle cylinder causing the shuttle to close.

2. While the shuttle is closed, the coating material passes through the shuttle and refills the pump.

3. The next time the trigger is squeezed (whether the pump is completely refilled or not), the sequence repeats.
Stop Spraying (contd.)

Fig. 2-2 Compact Manual Iso-Flo system schematic

1. Air spray device
2. Spray device trigger
3. Limit valve
4. Air-piloted fluid pressure regulator
5. Pump
6. Air release valve
7. Quick exhaust valve (used as a biased shuttle valve)
8. Lubricator
9. Check valve
10. Drain cock
11. Door interlock valve
12. Shuttle assembly
13. Electrostatic cable (optional)
14. Pilot valve
15. Pressure switch (optional)
16. Flow sensor
17. Toggle valve
18. Filter
19. Shuttle valve
20. Air pressure regulator for fluid pressure delivery
21. Atomizing air regulator (optional)
Door Interlock Valve

See Figure 2-2. The door interlock valve (11) shuts the system down if the door is opened. The following steps describe what happens:

1. When the door is opened, the door interlock valve (11) exhausts the pilot on the pilot valve (14), which closes the coating material shuttle (12) and grounds out the system.

2. The same air passes through the door interlock valve and through the shuttle valve (19).

3. The shuttle valve (19) sends a pilot to the air release valve (6) allowing air to flow to the air motor of the pump (5).

NOTE: The air to the air motor should be the same pressure as the system air. If the system air pressure exceeds the coating material inlet pressure and the spray device is triggered, the coating material pump will purge itself, even though the coating material shuttle is closed. This feature is useful when changing color in the Iso-Flo system.

4. Specifications and Operating Requirements

Table 2-2 provides the specifications and operating requirements for the Compact Manual Iso-Flo system.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>32 x 16 x 8 in. (813 x 406 x 203 mm) H x W x D.</td>
</tr>
<tr>
<td></td>
<td>19 in. (483 mm) wide at mounting flanges</td>
</tr>
<tr>
<td>Air input pressure</td>
<td>80–120 psi (5.5 to 8.3 bar), 2 SCFM (0.9 liters/sec)</td>
</tr>
<tr>
<td>Coating material input pressure</td>
<td>80–150 psi (5.5 to 10.3 bar)</td>
</tr>
<tr>
<td>Flow/pressure to spray device</td>
<td>Up to 15 ounces (0.44 liters) per minute at 60 psi (4.1 bar), 20 sec at Zahn 2, ambient temperature.</td>
</tr>
<tr>
<td>Electrostatic voltage</td>
<td>Up to 60 kV</td>
</tr>
</tbody>
</table>
Section 3

Installation
Section 3
Installation

1. Introduction

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

Installation procedures vary, depending on the following factors:

- where the coating material is charged, either
  - inside the unit, or
  - at the gun
- how the power supply is controlled if coating material is charged inside the unit, either
  - with a pressure switch activated by the air signal from the flow sensor, or
  - with a flow switch in the atomizing air line
- how atomizing air pressure is regulated, either
  - at the spray device, or
  - with a separate regulator installed either inside or outside the cabinet
Figure 3-1 shows a typical waterborne air-spray system installation.

Typical Waterborne Air Spray System Installation

Fig. 3-1 Typical waterborne air-spray system installation

2. Iso-Flo unit    7. Supply pump    12. Electrostatic power supply
3. Fluid regulator    8. Airline drip-leg drain valve    13. Pressure or flow switch (can be installed on the power supply
4. Fluid filter drain valve    9. Main air shutoff valves
5. Fluid heater (optional)    10. Filter/regulator/lubricator assembly

Fluid Lines

Electrostatic cable
Atomizing air
System air
Charged paint
Uncharged paint

Manual 10-10
108 390B
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Issued 7/96
2. **Mounting and Connections**

Install the Compact Manual Iso-Flo system between the coating material kitchen or pump and the spray device. This allows charged coating material to flow to the spray device, but blocks voltage from grounding at the kitchen or the pump.

**NOTE:** Locate the unit inside or near the spray booth, or on a dolly so the coating material hose connecting the Iso-Flo system and the spray device is as short as possible.

No electricity or external controls are required for the Iso-Flo system. Compressed air powers the Iso-Flo and it operates automatically in response to the spray device trigger. To install, mount the unit and connect the air, fluid supply, spray device hoses, and electrostatic cable.

Mounting holes are provided in the side flanges. Dimensions, hole patterns, hose connections, and cable connections are shown in Figure 3-2.
2. Mounting and Connections (contd.)

Fig. 3-2 Compact Manual Iso-Flo system mounting dimensions and connection points

1. Fluid inlet: 3/8-in. NPTF fitting
2. Compressed air: 1/4-in. NPTF fitting
3. Atomizing air: 1/4-in. NPSM fitting
4. Fluid outlet: 3/8-in. NPSM fitting
5. Electrostatic cable connection: #10-32 screw
6. Flow sensor port (used with the pressure switch): 1/8-in. NPTF port
7. Electrostatic cable access
8. Fluid inlet
9. Fluid and atomizing air outlet
10. Ground strap
11. Compressed air line (system air)
Recommended Hoses

WARNING: To prevent electrical shock, and to retain FM approval, use recommended types of fluid hoses.

When installing the Iso-Flo system, use the following:

- a fluid hose that has protective insulation, double insulation, or reinforced insulation
- an air hose with a conductive outer braid surrounding the hose. The conductive braid must be grounded at the connection to the Iso-Flo system and the spray device handle

3. Installation Instructions

Make all air, fluid, and cable connections through the fittings and holes in the top of the cabinet. See Figure 3-2. To install the Iso-Flo system, use the following steps:

1. Mount the Iso-Flo cabinet to a wall inside or near the spray booth, or on a dolly. Use four 1/4-in. fasteners.

2. Clamp the ground strap (10), included with the system and located on the COMPRESSED AIR inlet (2), to a true earth ground.

3. Connect the coating material supply hose to the 3/8-in. NPTF labeled FLUID INLET (1, 8) located at the top of the cabinet.

4. Connect compressed air for atomization to the 1/4-in. NPTF port labeled COMPRESSED AIR (2) located on the top of the cabinet. Operating air for the system is tapped off the same line inside the unit.

5. Attach the end of the electrostatic cable (5) to the shuttle air cylinder. Use the #10-32 screw or an appropriate cable adapter.

6. Connect the spray device to the Iso-Flo system. For more information, refer to your spray device manual.

7. Connect the fluid hose to the 3/8-in. NPSM (4) fitting located at the base of the pump inside the cabinet.

8. Connect the grounded air hose for atomizing air to the 1/4-in. NPSM fitting (3) located on the air valve inside the cabinet near the top. Both the fluid and air hoses exit through the same hole in the top of the cabinet.

CAUTION: Make certain that any grounded braid or fitting on the cable jacket extends no further than three inches below the top of the cabinet. Failure to do so could cause equipment damage.
If your air spray device has no integral atomizing air pressure regulator, you must install a regulator in the air line ahead of the spray device, either inside or outside the Iso-Flo cabinet.

**Installing Regulator Inside Cabinet**

You can connect a compact regulator and gauge directly to the flow sensor. To do this, you must remove the tee and drain cock in the atomizing air port to provide enough room for the regulator.

See Figure 3-3 and follow these steps:

1. Remove the tee and drain cock from the flow sensor (3) atomizing air port.
2. Remove the 1/4-in. NPT x 1/4-in. NPSM fitting (2) from the tee.
3. Connect the regulator (1) to the flow sensor (3) with a close 1/4-in. NPT nipple.
4. Install the 1/4-in. NPT x 1/4-in. NPSM fitting (2) into the regulator outlet.
5. Connect a grounded air hose to the regulator (1) and route the hose through the fluid outlet hole in the top of the cabinet.

**Fig. 3-3 Installing the regulator in cabinet**

1. Atomizing air regulator
2. 1/4 in. NPSM fitting
3. Flow sensor
4. 1/4 in. NPTF fitting
5. Ground wire to air inlet
6. Grounded air hose
Installing Regulator Outside Cabinet

Mount the atomizing air regulator outside the cabinet if it is too large to fit inside. See Figure 3-3 and follow these steps:

1. Connect a grounded air hose (6) to the 1/4-in. NPT x 1/4-in. NPSM fitting (2) on the flow sensor (3). Route the hose through the fluid outlet hole in the cabinet to the regulator inlet.

2. Connect another grounded air hose (6) between the regulator outlet and spray device air inlet.

3. Connect a ground strap or wire (5) between the 1/4 in. NPT x 1/4 in. NPSM hose fitting (2) and the cabinet air inlet fitting.

**WARNING:** Risk of electrical shock. Failure to connect a ground strap may result in personal injury, death, or equipment damage. Check for continuity between the spray device handle and the ground.
Section 4

Operation
Section 4
Operation

1. Introduction

This section contains instructions for preparing, adjusting, operating, and maintaining your Compact Manual Voltage-Block Iso-Flo system.

2. Preparing the Lubrication System

The lubricator must be filled with lubricant and the flow rate adjusted on initial startup of the Compact Manual Iso-Flo system.

Preparing a Lubricant

Nordson type Q solvent is normally used as a lubricant. It is shipped in concentrated form and must be mixed with 10 gallons of water before use. Refer to section 7 of this manual for the type Q solvent part number.

NOTE: Do not use the mixing directions provided on the container label. Failure to follow the proper mixing instructions (noted above) could cause polymerization of the Q solvent concentrate, resulting in clogging of components.

Filling Lubricator and Adjusting Flow Rate

See Figure 4-1. Use the following steps when filling the lubricator and adjusting its flow rate:

1. Unscrew the filler cap (1) from the top of the lubricator and fill the lubricator.

2. Turn the flow-rate adjustment screw (2) counterclockwise until open.

3. Start the system and then adjust the lubricator so it delivers three to five drops of lubricant for each spray cycle (between pump refills).

   Use the lubricator sight glass (3) to monitor the flow rate.

   NOTE: When first filled, the lubricator may not prime itself and begin delivering lubricant to the pump air for several operating cycles.
Before putting a new system into service, flush it with a cleaning solution compatible with the system equipment and coating material you will be using. Flushing removes oils, metal filings, and other contaminants left from the manufacturing and installation process.

**WARNING:** Always shut off electrostatic voltage before opening the cabinet door. Failure to observe this warning could result in personal injury or death.

**CAUTION:** Failure to use a compatible cleaning solution could cause equipment damage or fluid contamination.

**WARNING:** Make sure there is adequate ventilation during the flushing procedure.
3. **New System Flush (contd.)**

To perform the new system flush, use the following steps:

1. Shut off the electrostatic power supply.

2. Disconnect the fluid hose at the spray device and secure the end of the hose in a waste container.

3. Turn on the compressed air to the system.

4. Set the system air pressure at 80–120 psi (5.5–8 bar).

5. Set the output fluid pressure to the maximum.

6. Supply cleaning solution to the Iso-Flo system and set the fluid pressure to the maximum available (up to 150 psi or 10.3 bar).

7. With the door open, press the door interlock valve (see Figure 2-1) and squeeze the spray device trigger (to cause air to flow) to fill the Iso-Flo system pump with cleaning solution.

8. Release the door interlock valve. System air pressure will force the cleaning solution out of the system pump, and subsequently out of the hose.

9. Repeat steps 7 and 8 several times to make sure the system is flushed thoroughly.

10. Reconnect the fluid hose to the spray device and repeat steps 7 and 8.

11. Flush the system until the cleaning solution and any remaining air are purged from the system.

12. Fill the system with coating material.

13. Set the atomizing air pressure, fluid output, and lubricator flow rate.

14. Close the cabinet door.

4. **Daily Operation**

Startup and shutdown procedures can vary depending on your safety regulations and system requirements. If the solids will not settle out or the coating material will not cure in the system, you can leave your system full of coating material overnight.

**Startup**

**WARNING:** All conductive equipment in the spray area must be connected to a true earth ground. Check the Iso-Flo cabinet ground, making sure that internal as well as external connections are clean and secure. Failure to observe could result in property damage, personal injury, or death.
For daily startup use the following steps. This procedure assumes the system was left full of coating material after the last shutdown.

1. Make sure the electrostatic voltage is off.

2. Check the lubricant level inside the Iso-Flo system and refill the lubricator, as required.

3. Empty excess lubricant from the filter bowl.

4. Turn on the compressed air to the Iso-Flo system.

5. Set the fluid pressure to a maximum of 150 psi (10.3 bar).

6. Close the door and adjust the fluid pressure.

7. Turn on the electrostatic power supply or the spray-device control system.

8. Begin spraying.

The Iso-Flo system is always ready for spraying, even if the pause in production is not long enough to allow the pump to refill completely. Squeezing the trigger resets the Iso-Flo system and spraying can resume.

**NOTE:** During short breaks in production, such as lunch time, shut off the electrostatic voltage, but leave the air supply turned on. This keeps the shuttle closed and prevents coating material from drying on the couplings.

**Adjustments**

The air pressure regulator controls the fluid regulator at a ratio of 1:1. For example, applying 10 psi air pressure to the fluid regulator yields approximately 10 psi fluid pressure.

Use the air pressure regulator and gauge located inside the cabinet to change the fluid pressure. To adjust the fluid output pressure for an accurate spray pattern, use the following procedure:

1. Make a small adjustment to the air regulator.

2. Close the Iso-Flo cabinet door. The shuttle cannot disengage unless the door is closed.

3. Squeeze the spray device trigger.
**Shutdown**

For daily shutdown, use the following steps:

1. Shut off the electrostatic power supply.
2. Open the cabinet door to ground the system and then close the door.
3. Shut off compressed air to the system and reduce the pressure of fluid input and the coating material supply pump to 0.
4. Trigger the spray device to relieve fluid and compressed air pressure.
5. Open the cabinet door and then clean the male and female couplings with a compatible cleaning solution.
6. Close the cabinet door.

**System Flush and Material Change**

Use the following steps when changing coating material or cleaning the system:

1. Turn off the electrostatic power supply and atomizing air.
2. Reduce the fluid input supply pressure to 0.
3. Open the cabinet door. Trigger the spray device into the spray booth or a grounded waste container to expel any remaining coating material.
4. Supply cleaning solution to the Iso-Flo system and set the compressed air pressure to the maximum available (up to 120 psi or 10.3 bar).
5. Push the door interlock valve. Allow the system pump to fill with several inches of cleaning solution, as indicated by the rise of the pump rod. Then, manually trip the upper limit valve to stop the filling.
6. Release the door interlock valve and trigger the spray device into the spray booth or a grounded waste container. This flushes the system pump, hose, and spray device.
7. Repeat steps 5 and 6 until the cleaning solution runs clear. Continue flushing the system until the cleaning solution and any remaining air have been purged from the system.
8. Push the door interlock valve. Allow the Iso-Flo pump to fill with several inches of coating material, as indicated by the rise of the pump rod. Then, manually trip the upper limit valve to stop the filling.
9. Release the door interlock valve button and trigger the spray device. The new coating material will flush any remaining cleaning solution out of the pump, hose, and gun.

10. Set the atomizing air pressure and fluid input pressure to the normal operating settings.

11. Close the cabinet door, turn the power supply back on, and start applying the new coating material.

5. **Long-term Shutdown**

When shutting the system down for an extended period, use the following steps:

1. Turn off the electrostatic voltage.

2. Flush the system with compatible cleaning solution using steps 1–7 in *System Flush and Material Change*.

3. Relieve the compressed air pressure. Drain the system completely.

4. Open the cabinet door and clean the male and female couplings, the exterior of all cabinet components, and the cabinet with a compatible cleaning solution.

5. Check the lubricant level and refill the lubricators, as required.

6. Empty and clean excess lubricant from the filter bowls, as required.

7. Close the cabinet door.

6. **Maintenance**

The Compact Manual Iso-Flo system requires minimal routine maintenance. Maintenance points are shown in Figure 2-1. To keep the system operating at its maximum efficiency, perform the following procedures:

**Daily**

For daily maintenance, use the following steps:

1. Turn off the electrostatic voltage.

2. Open the cabinet door to ground the system, then close the door.

3. Relieve the compressed air pressure.

4. Open the cabinet door and clean the couplings with a compatible cleaning solution to prevent coating material buildup.
Daily (contd.)

5. Check the lubricant level and refill the lubricator, as required.
6. Empty and clean excess lubricant from the filter bowl, as required.
7. Close the cabinet door.

Weekly

For weekly maintenance, use the following steps:

1. Turn off the electrostatic voltage.
2. Open the cabinet door to ground the system, then close the door.
3. Relieve the compressed air pressure.
4. Flush the system with a compatible cleaning solution, as needed.
5. Clean the couplings with a compatible cleaning solution and then lightly coat the female coupling shafts with O-Ring grease. Use a stiff brush to work the grease through the spring.
6. Check the lubricator level and refill if necessary. Refer to Preparing the Lubrication System earlier in this section.
Section 5

Troubleshooting
Section 5
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.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Coating material does not flow when spray device is triggered</td>
<td>5-2</td>
</tr>
<tr>
<td>2. Coating material flow is poor or erratic</td>
<td>5-2</td>
</tr>
<tr>
<td>3. Coating material is thin or watery at start-up</td>
<td>5-2</td>
</tr>
<tr>
<td>4. No electrostatic voltage, or the electrostatic voltage is low or erratic</td>
<td>5-2</td>
</tr>
<tr>
<td>5. Lubricator filter contains coating material</td>
<td>5-3</td>
</tr>
<tr>
<td>6. Pump is making noise</td>
<td>5-3</td>
</tr>
<tr>
<td>7. Shuttle is not closing to refill pump</td>
<td>5-3</td>
</tr>
<tr>
<td>8. Shuttle is not disengaging when spray device is triggered</td>
<td>5-3</td>
</tr>
<tr>
<td>9. Shuttle couplings leaking</td>
<td>5-3</td>
</tr>
</tbody>
</table>

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

WARNING: Turn off the electrostatic voltage before opening the Iso-Flo cabinet door. Failure to observe this warning could result in personal injury or death.
2. Troubleshooting Procedures

The following table provides general information for troubleshooting the Iso-Flo unit.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Coating material does not flow when spray device is triggered</td>
<td>System air pressure is too low</td>
<td>Check and adjust system air pressure to a minimum of 80 psi (5.5 bar).</td>
</tr>
<tr>
<td></td>
<td>Fluid hose from the Iso-Flo pump to the spray device is clogged, or the fluid hose from the shuttle to the Iso-Flo pump is clogged</td>
<td>Check for blockage in fluid hose. Clean or replace fluid hose(s), as needed.</td>
</tr>
<tr>
<td></td>
<td>Hose or filter ahead of Iso-Flo system is clogged</td>
<td>Check for blockage in the input hose, the filter, or both. Clean or replace, as needed.</td>
</tr>
<tr>
<td></td>
<td>Spray device is clogged</td>
<td>Check spray device.</td>
</tr>
<tr>
<td>2. Coating material flow is poor or erratic</td>
<td>Spray device flow control valve is almost or all the way closed. (Applies only to spray devices with integral flow control valve.)</td>
<td>Open the spray device valve.</td>
</tr>
<tr>
<td></td>
<td>System air pressure is too low to operate pump</td>
<td>Adjust system air pressure to as high as possible. (80–150 psi or 5.5–10.3 bar).</td>
</tr>
<tr>
<td></td>
<td>Fluid hose from the pump to the spray device is blocked</td>
<td>Adjust fluid output pressure. If fluid output pressure is not the problem, clean or replace fluid hose.</td>
</tr>
<tr>
<td>3. Coating material is thin or watery at start-up</td>
<td>System is not completely purged of cleaning solution</td>
<td>Turn off electrostatic voltage, open cabinet door, and trigger the spray device. Continue spraying until the pump empties completely. If necessary, increase system air pressure.</td>
</tr>
<tr>
<td>4. No electrostatic voltage, or the electrostatic voltage is low or erratic</td>
<td>Water in compressed air is making the air lines conductive</td>
<td>Filter and dry air before it enters the Iso-Flo system.</td>
</tr>
<tr>
<td></td>
<td>Coating material hose is grounding out</td>
<td>Inspect hose and repair or replace, as necessary.</td>
</tr>
<tr>
<td></td>
<td>Defective electrostatic power supply, electrostatic cable, cable connection, or control circuit</td>
<td>Check electrical equipment and repair or replace, as necessary.</td>
</tr>
<tr>
<td></td>
<td>System is grounding out because door valve is not actuated</td>
<td>Make sure the door closes tightly. If necessary, adjust the door valve.</td>
</tr>
</tbody>
</table>
## Troubleshooting Procedures (contd.)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Lubricator filter contains coating material</td>
<td>Pump seals are worn, coating material is leaking</td>
<td>Replace or repair pump seals.</td>
</tr>
<tr>
<td>6. Pump is making noise</td>
<td>Air is in fluid lines</td>
<td>Turn off electrostatic voltage, open cabinet door, and trigger spray device into the spray booth or a grounded waste container to purge air.</td>
</tr>
<tr>
<td>7. Shuttle is not closing to refill pump</td>
<td>Air is leaking from the atomizing air hose or fittings</td>
<td>Repair or replace air hoses or fittings. Make sure you use sealant on fitting threads.</td>
</tr>
<tr>
<td></td>
<td>Door valve is malfunctioning</td>
<td>Turn off electrostatic voltage, open cabinet door. Shuttle should close when door is opened.</td>
</tr>
<tr>
<td></td>
<td>Sync valve is malfunctioning</td>
<td>Replace sync valve if it does not shift in response to air pressure.</td>
</tr>
<tr>
<td>8. Shuttle is not disengaging when spray device is triggered</td>
<td>System air pressure is too low</td>
<td>Increase system air pressure.</td>
</tr>
<tr>
<td></td>
<td>Cabinet door is open</td>
<td>Close the cabinet door.</td>
</tr>
<tr>
<td></td>
<td>Cabinet door is not making contact with door valve push-button</td>
<td>Make sure door valve push-button is depressed when door is closed.</td>
</tr>
<tr>
<td></td>
<td>Pilot valve is malfunctioning</td>
<td>Replace valve if it does not shift in response to air pressure in the line.</td>
</tr>
<tr>
<td>9. Shuttle couplings leaking</td>
<td>Dry female coupling shaft</td>
<td>Grease spring and shaft with O-Ring lubricant and a stiff brush.</td>
</tr>
<tr>
<td></td>
<td>Male coupling ball and seat not sealing due to contamination</td>
<td>Flush with cleaning solution. Disassemble coupling and clean, if necessary.</td>
</tr>
<tr>
<td></td>
<td>Dried coating material is on the sealing surfaces of couplings</td>
<td>Clean couplings with a compatible cleaning solution. If necessary, disassemble couplings and clean.</td>
</tr>
<tr>
<td></td>
<td>Coupling O-rings damaged or out of grooves</td>
<td>Disassemble couplings and repair.</td>
</tr>
</tbody>
</table>
Section 6
Repair

1. Introduction
This section covers the repair of selected components.

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

2. Male and Female Coupling Repair
The male and female couplings are repairable using the coupling repair kits listed in section 7 of this manual. Only the parts included in the repair kit and the safety pin in the male coupling are replaceable. If other parts of a coupling are damaged, the entire coupling assembly must be replaced. Instructions are included with the kits.

3. Flow Sensor Repair
Repair is limited to disassembly, parts replacement, and reassembly.

1. See Figure 6-1 and Figure 2-1. Remove the flow sensor from the Iso-Flo cabinet.

2. Unscrew the 4 socket-head cap screws (11).

3. Invert the sensor and gently remove the body (4) from the top.

4. Block all the ports in the body (4) except for the atomizing air output port (5). Make sure you also block the air passage. (A fingertip is adequate.)

5. Slowly apply compressed air at 20–30 psi (1.4–2 bar) to the atomizing air output (5). This lifts the valve cartridge (8) out of the body (4).

6. Remove the O-ring (10) and apply O-ring grease. Grease the valve cartridge (8) O-rings before reassembling the flow sensor. Be careful not to cover the small holes on the cartridge with grease.

NOTE: If you install a new valve cartridge (8), discard the spring (6) that comes with the valve cartridge and use the spring specified in the flow sensor parts list. The ball (3) on top of the valve cartridge (8), shown in Figure 6-1, must be ordered separately.
3. **Flow Sensor Repair**  
*(contd.)*

7. Put the spring (6) on the cartridge stem.

8. Invert the body (4) and push the valve cartridge (8) through the hole. Put an alignment mark on the body and the top.

9. Put the large ball in first. The lever goes down, with the small ball on top.

10. Put the body on the top, aligning with the marks.

11. Holding firmly, invert the flow sensor and replace the screws (11).

12. Remove the plugs.

13. Reinstall the flow sensor into the cabinet and reconnect all lines.

---

Fig. 6-1  Cutaway view of flow sensor

1. Main air input  
2. Screen  
3. Ball  
4. Body  
5. Atomizing air output  
6. Spring  
7. Pressure switch output  
8. Valve cartridge  
9. Lever  
10. O-ring  
11. Socket-head cap screw  
12. Flow sensor cap
Section 7

Parts
Section 7
Parts

1. Introduction

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

Using the Illustrated Parts List

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

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

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Part</th>
<th>Description</th>
<th>Quantity</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>—</td>
<td>000 000</td>
<td>Assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>000 000</td>
<td>• Subassembly</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>000 000</td>
<td>• • Part</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

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

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

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

### System Assemblies and Miscellaneous Hardware

See Figure 7-1.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part</th>
<th>Description</th>
<th>Quantity</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>159 986</td>
<td>Iso-Flo, Compact Manual</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>- - - -</td>
<td>• Isolator flow sensor assembly</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>900 556</td>
<td>• Tubing, nylon, 0.250-in. OD x 0.035 wall thickness</td>
<td>12</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>- - - -</td>
<td>• Pump, mini, assy, Iso-Flo</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>4</td>
<td>981 436</td>
<td>• Screw, skt, 5/16-18 x 2.00-in., bl</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>971 266</td>
<td>• Elbow, male, 0.25-in. tube x 0.25-in NPT</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>900 557</td>
<td>• Tubing, nylon, 0.375 in. x 0.050 in.</td>
<td>3</td>
<td>B</td>
</tr>
<tr>
<td>7</td>
<td>972 238</td>
<td>• Elbow, male, 3/8-in. x 1/4-in., brass</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>159 093</td>
<td>• Shuttle, single connector, 9-in. stroke</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>9</td>
<td>- - - -</td>
<td>• Valve, door, air operated, assembly, Iso-Flo</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>10</td>
<td>973 239</td>
<td>• Adapter, pipe, SAE, 3/8-in., brass</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>240 976</td>
<td>• Clamp, ground w/wire</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

NOTE A: For parts breakdowns, see the following subsections.

B: Supplied in bulk in 1-foot increments.
Fig. 7-1    Front view of Compact Manual Iso-Flo System
Flow Sensor Assembly

See Figure 7-2.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part</th>
<th>Description</th>
<th>Quantity</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>973 968</td>
<td>• Adapter, bulkhead, 1/4-in NPT</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>973 027</td>
<td>• Nipple, schedule 40, 1/4-in. NPT x 7/8-in., brass</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>973 223</td>
<td>• Cross, pipe, 1/4 in., brass</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>971 267</td>
<td>• Tee, male, 1/4-in. tube x 1/4-in. NPT</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>973 275</td>
<td>• Tee, pipe, street, 1/4-in. NPT, brass</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>973 469</td>
<td>• Nipple, hex, 1/4 in. x 1/8 in. x 0.687, brass</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>901 478</td>
<td>• Regulator, air, 1/8-in. NPT</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>973 571</td>
<td>• Plug, pipe, socket, 1/4-in.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>972 556</td>
<td>• Connector, male, 1/4-in. NPSM x 1/4-in. NPT</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>168 082</td>
<td>• Drain cock, 1/4-in. NPT, brass</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>160 357</td>
<td>• Sensor, flow, isolator</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>- - - -</td>
<td>• Screen, filter, 1/4-in. NPT port</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>900 001</td>
<td>• Ball, 440SS, 0.500 l. dia., 50</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>940 260</td>
<td>• O-ring, hot paint, 1.250 in. x 1.375 in. x 0.063 in.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>900 016</td>
<td>• Ball, chrome steel, 0.156 in., 10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>987 074</td>
<td>• Spring, compression, 0.380 x 0.148 OD x 0.021 in.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>324 261</td>
<td>• Cartridge, valve, handgun</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>981 893</td>
<td>• Screw, socket hd., #10-32 x 1/2-in., zinc-plated</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>125 211</td>
<td>• Valve, air-operated, MPA-3P</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>- - - -</td>
<td>• Internal lock washer</td>
<td>1</td>
<td></td>
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<tr>
<td>21</td>
<td>- - - -</td>
<td>• Brass spacer supplied</td>
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<tr>
<td>22</td>
<td>901 089</td>
<td>• Valve, air-operated, FV-4P</td>
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<tr>
<td>23</td>
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<td>• Internal lock washer</td>
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<td></td>
</tr>
<tr>
<td>24</td>
<td>- - - -</td>
<td>• 0.062-in. thick nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>973 402</td>
<td>• Plug, pipe, skt, flush, 1/8-in. NPT, zinc-plated</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>972 119</td>
<td>• Elbow, male, 1/4-in. tube x 1/8-in. NPT</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>161 000</td>
<td>• Valve, needle, MNV-1P</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Continued on next page
**Flow Sensor Assembly (contd.)**

<table>
<thead>
<tr>
<th>Item</th>
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<th>Description</th>
<th>Quantity</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>901 237</td>
<td>• Gauge, air, 0–100 psi, 0–7 KG/CM2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>901 063</td>
<td>• Valve, shuttle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>973 039</td>
<td>• Nipple, brass, schedule 40, 1/8-in. x 3/4-in.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>973 259</td>
<td>• Tee, pipe, street, 1/8-in. X 1/8-in. NPT</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 7-2  Flow sensor assembly
### Pump and Lubricator Assembly

See Figure 7-3.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part</th>
<th>Description</th>
<th>Quantity</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>972 119</td>
<td>Pump, mini, assembly, Iso-Flo</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>901 378</td>
<td>• Elbow, male, 1/4-in. tube x 1/8-in. NPT</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>981 161</td>
<td>• Valve, air-operated, MJV-3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>983 124</td>
<td>• Screw, pan hd., #10-32 x 0.375-in.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>973 278</td>
<td>• Washer, lock, #10, steel, zinc-plated</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>901 122</td>
<td>• Valve, check, 1/8-in. NPT, 0–300 psi</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>973 156</td>
<td>• Nipple, brass, 1/4-in. tube x 7/8-in.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>172 927</td>
<td>• Valve, brass, schedule 40, 1/8-in. NPT x 3/4 in.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>161 005</td>
<td>• Valve, exhaust</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>170 049</td>
<td>• Filter, mini, 1/8-in. NPT</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>971 292</td>
<td>• Post, valve, air, epoxy/glass</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>901 262</td>
<td>• Actuator, cam, 11925</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>145 707</td>
<td>• Nipple, brass, schedule 40, 1/8-in. NPT x 3/4 in.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>973 039</td>
<td>• Valve, air release, 1/8-in. NPT, brass</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>170 095</td>
<td>• Base, valve, post</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>972 553</td>
<td>• Connector, male, 1/4-in. NPTF x 3/8-in. NPSM</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>973 444</td>
<td>• Plug, pipe, square, 3/8-in. NPT, Delrin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>107 517</td>
<td>• Regulator, fluid nylon</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>973 971</td>
<td>• Nipple, hex, 3/8-in. x 1/4-in. x 1.406 NPT, SS</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>972 238</td>
<td>• Nipple, hex, 0.25 x 0.125 x 1.188, steel, zinc-plated</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Pump and Lubricator Assembly (contd.)

Fig. 7-3  Pump and lubricator assembly
## Shuttle Assembly

See Figure 7-4.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part</th>
<th>Description</th>
<th>Quantity</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>—</td>
<td>159 093</td>
<td>Shuttle, single connector, 9-in. stroke</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>984 177</td>
<td>• Nut, nylon, (1/2)-13</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>- - - -</td>
<td>• Block, shuttle, top, aluminum</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>130 309</td>
<td>• Coupling, male</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>4</td>
<td>- - - -</td>
<td>• Rod, guide, 16-1/2 in.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>130 307</td>
<td>• Coupling, female</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>981 145</td>
<td>• Screw, pan hd., #10-24 x (1/2)-in., SL, ZN</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>- - - -</td>
<td>• Cylinder, air, 9-in.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>- - - -</td>
<td>• Block, shuttle, bottom, aluminum</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>- - - -</td>
<td>• Block, shuttle, slider, aluminum</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>901 381</td>
<td>• Bearing, nylon, 0.755 x 1.004 x 1.00 in.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>986 334</td>
<td>• Ring, retaining, internal, 100, inverted</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE A:** For parts breakdown, see *Male and Female Couplings* later in this section.
Shuttle Assembly (contd.)

Fig. 7-4  Shuttle assembly
### Male Coupling

See Figure 7-5.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part</th>
<th>Description</th>
<th>Quantity</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>—</td>
<td>130 309</td>
<td>Coupling, male</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>- - - -</td>
<td>• Tip, coupling</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>942 112</td>
<td>• O-ring, hotpaint, 0.250 x 0.500 x 0.125 in.</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>- - - -</td>
<td>• Washer, flat, 0.625-in. x 0.390-in.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>940 150</td>
<td>• O-ring, hotpaint, 0.563 x 0.688 x 0.063 in.</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>5</td>
<td>900 046</td>
<td>• Ball, 302/316 SS, 0.343-in. dia., 100</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>130 323</td>
<td>• Spring, compression, 1.750 x 0.360 OD x 0.040 in.</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>7</td>
<td>139 389</td>
<td>• Pin, valve, safety</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>987 070</td>
<td>• Spring, compression, 0.750 x 0.240 OD x 0.026 in.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>983 025</td>
<td>• Washer, flat, 0.375 in. x 0.187 in.</td>
<td>1</td>
<td>B</td>
</tr>
<tr>
<td>10</td>
<td>- - - -</td>
<td>• Adapter, male</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>945 017</td>
<td>• O-ring, hotpaint, 3/8-in. tube</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>983 260</td>
<td>• Washer, nylon, 0.312 x 0.151 x 0.062 in.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>983 026</td>
<td>• Washer, flat, 0.312-in. x 0.156-in. MS, SS</td>
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</tr>
<tr>
<td>14</td>
<td>986 116</td>
<td>• Retaining ring, ext., 15</td>
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<td></td>
</tr>
</tbody>
</table>

**NOTE A**: Noted parts are available in Kit, coupling repair, male and female.

**B**: This washer was used on earlier versions of the male coupler with a 1/4-in. thru-hole.
Male Coupling (contd.)

Fig. 7-5   Male coupling
### Female Coupling

See Figure 7-6.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part</th>
<th>Description</th>
<th>Quantity</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>—</td>
<td>130 307</td>
<td>Coupling, female</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>941 120</td>
<td>• O-ring, hotpaint, 0.500 x 0.688 x 0.094 in.</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>- - - - -</td>
<td>• Collar, coupling</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>940 305</td>
<td>• O-ring, PTFE, 0.188 x 0.375 x 0.094 in.</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>4</td>
<td>- - - - -</td>
<td>• Post, coupling</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>- - - - -</td>
<td>• Sleeve, coupling</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>130 340</td>
<td>• Spring, compression, 1.500 x 1.095 OD x 0.120 in.</td>
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<td></td>
</tr>
<tr>
<td>7</td>
<td>941 110</td>
<td>• O-ring, hotpaint, 0.438 x 0.625 x 0.094 in.</td>
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<td></td>
</tr>
<tr>
<td>8</td>
<td>130 319</td>
<td>• Body, post, coupling</td>
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<td></td>
</tr>
<tr>
<td>9</td>
<td>945 017</td>
<td>• O-ring, hotpaint, 3/8-in. tube</td>
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<td>A</td>
</tr>
<tr>
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<td>900 056</td>
<td>• Ball, black glass, 0.343-in. dia., 50</td>
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<td>A</td>
</tr>
<tr>
<td>11</td>
<td>130 324</td>
<td>• Spring, compression, 0.750 x 0.360 OD x 0.026 in.</td>
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</tr>
<tr>
<td>12</td>
<td>986 304</td>
<td>• Ring, retaining, internal, 43, push-on, SS</td>
<td>1</td>
<td>A</td>
</tr>
</tbody>
</table>

**NOTE A**: Noted parts are available in Kit, coupling repair, male and female.
Female Coupling (contd.)

Fig. 7-6 Female coupling
**Door Interlock Valve**

See Figure 7-7.

<table>
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<tr>
<th>Item</th>
<th>Part</th>
<th>Description</th>
<th>Quantity</th>
<th>Note</th>
</tr>
</thead>
<tbody>
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<td>—</td>
<td>—</td>
<td>Valve, door, air operated, assembly, Iso-Flo</td>
<td>1</td>
<td></td>
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<tr>
<td>1</td>
<td>972 119</td>
<td>Elbow, male, 1/4-in. tube x 1/8-in. NPT</td>
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<tr>
<td>2</td>
<td>172 715</td>
<td>Valve, limit, 2011-1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 7-7  Door interlock valve

**Repair Kits**

See Figures 7-5 and 7-6.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part</th>
<th>Description</th>
<th>Quantity</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>—</td>
<td>139 401</td>
<td>Kit, repair, coupling, male and female</td>
<td>AR</td>
<td></td>
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</table>

AR: As Required