iControl® Standard Console Hardware Manual

Installation, Troubleshooting, Repair, Parts

Part 1044158J06

Issued 01/10

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Notice

Trademarks

Part 1044158J06

Change Record

Revision	Date	Change
J05	01/10	Replaced solenoid valve 1033170 wtih 1099302 if using with old board (1023932), or replaced with 1099288 if using with new board (1099635).
J06	1/10	Added drawings for Nordson Positioner and Positioner/Reciprocator Plug-in Control Panels, and for Top Down and Bottom Up Positioner Control Panels.

Table of Contents

Section 1
Safety

Introduction

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

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

Qualified Personnel

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

Intended Use

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

Some examples of unintended use of equipment include

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

Regulations and Approvals

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

All phases of equipment installation must comply with all federal, state, and local codes.

Personal Safety

To prevent injury follow these instructions.

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

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Provide adequate ventilation to prevent dangerous concentrations of volatile materials or vapors. Refer to local codes or your material MSDS for guidance.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

Grounding

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

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

- All electrically conductive objects in the spray areas shall be electrically connected to ground with a resistance of not more than 1 megohm as measured with an instrument that applies at least 500 volts to the circuit being evaluated.
- Equipment to be grounded includes, but is not limited to, the floor of the spray area, operator platforms, hoppers, photoeye supports, and blow-off nozzles. Personnel working in the spray area must be grounded.
- There is a possible ignition potential from the charged human body. Personnel standing on a painted surface, such as an operator platform, or wearing non-conductive shoes, are not grounded. Personnel must wear shoes with conductive soles or use a ground strap to maintain a connection to ground when working with or around electrostatic equipment.
- Operators must maintain skin-to-handle contact between their hand and the gun handle to prevent shocks while operating manual electrostatic spray guns. If gloves must be worn, cut away the palm or fingers, wear electrically conductive gloves, or wear a grounding strap connected to the gun handle or other true earth ground.
- Shut off electrostatic power supplies and ground gun electrodes before making adjustments or cleaning powder spray guns.
- Connect all disconnected equipment, ground cables, and wires after servicing equipment.

Refer to the *Installation* section of this manual for more information on grounding.

Action in the Event of a Malfunction

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

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

Disposal

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

Safety Labels

Table 1-1 contains the text of the safety labels on the iControl console. The safety labels are provided to help you operate and maintain your console safely. See Figure 1-1 for the location of the safety labels.

Item	Part	Description
1.	1034161	**WARNING:** Disconnect power before servicing.
2.	178475	**WARNING:** Hot surface. Do not touch.

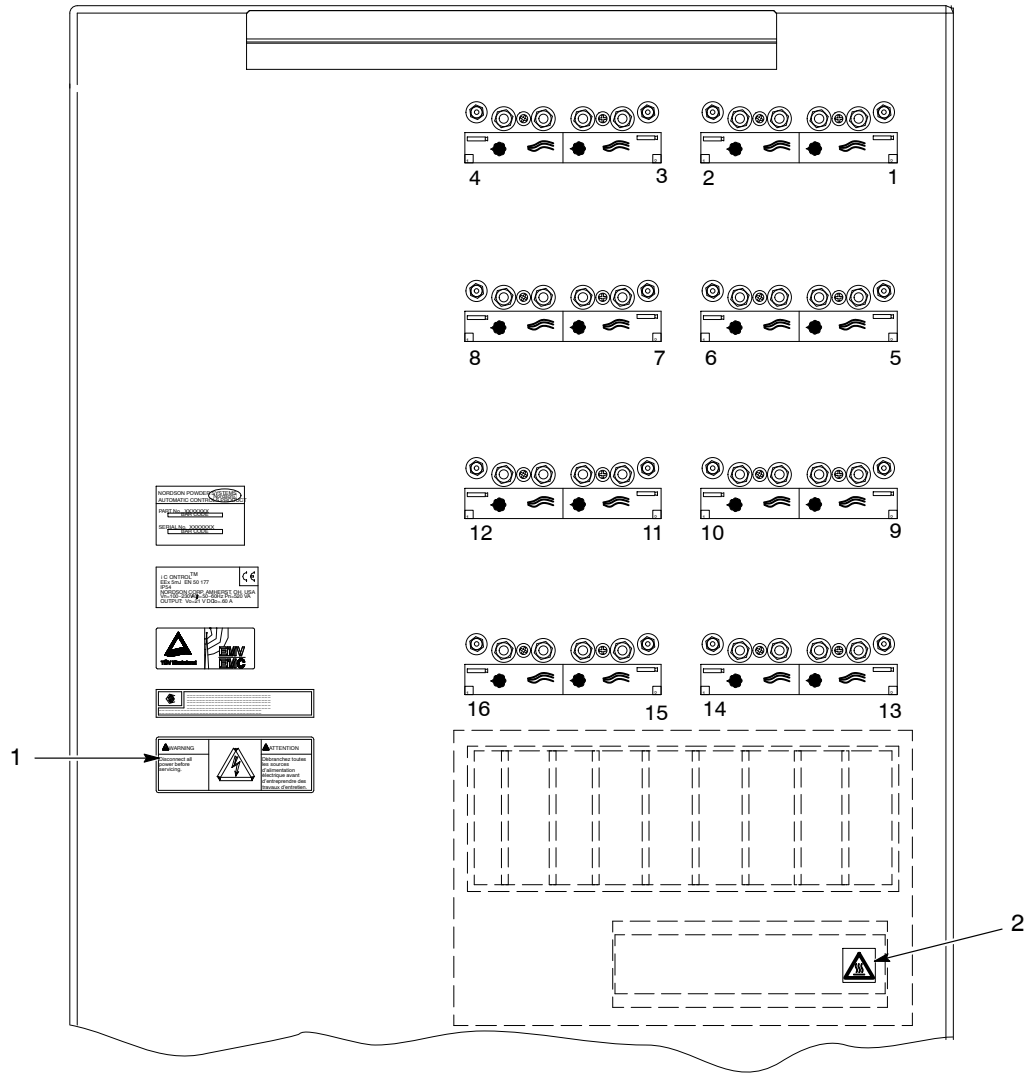


Figure 1-1 Safety Labels

Section 2
Overview

iControl System Manuals

This manual covers the iControl console and system hardware for **Standard iControl** systems used with Sure Coat, Versa-Spray, and Tribomatic spray guns only.

iControl manuals are organized as follows:

Operator Interface Manual covers configuration, preset setup, and operation using the iControl software and touch screen:

- 1056418

Operator Card for all versions:

- 1024758

Hardware Manuals, covering installation, troubleshooting, repair, and parts:

- Standard iControl System (old style): 1024757
- Standard iControl System (new style): 1044158, revision F and above

Standard iControl consoles control up to 16 guns per console.

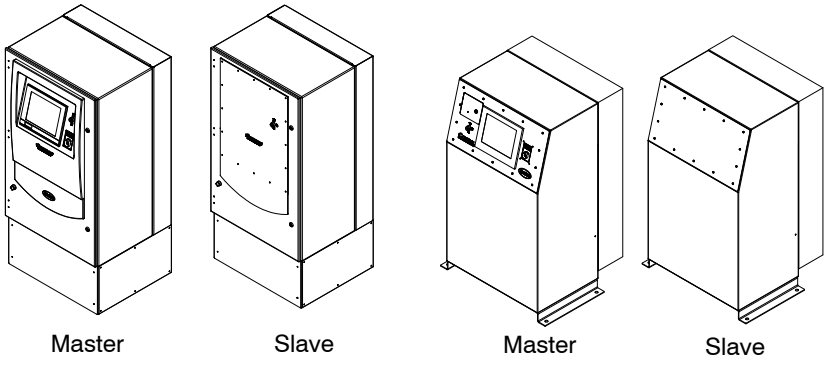


Figure 2-1 iControl Console Styles

Console and System Hardware and Software

See Figures 2-2 and 2-3. A fully equipped master console controlling 16 spray guns contains the following hardware:

- operator interface consisting of LCD touch-screen display, rotary dial, and interlock keyswitch
- single-board computer (PC)
- Compact Flash adapter and two Compact Flash cards, for program and user data
- I/O board, backplane, card cage, and 8 gun control cards (1 card controls 2 guns)
- power supply
- alarm, remote lockout, and conveyor interlock relays
- 8 iFlow digital flow modules (1 flow module supplies 2 guns)
- 4 preset precision regulators (one regulator supplies two flow modules)

Slave consoles control 16 guns but do not have an operator interface, SBC, CompactFlash cards, I/O board, or the alarm, lockout, and interlock relays.

The system requires the following external hardware:

- photoeye junction boxes
- zone photoeyes or discrete scanners
- part ID photoeyes or discrete scanners, or inputs from customer part ID system
- conveyor encoder

Options

In/Out Positioners (Horizontal or Vertical)

- analog scanners (to measure part width)
- scanner junction box
- in/out positioners and control panels
- network interface box, Ethernet cables, and Ethernet PCI card

Reciprocators

- analog scanners (to measure part height)
- reciprocators
- in/out positioner/reciprocator control panels

2nd Booth Option

The 2nd booth shares the signals from the conveyor encoder, zone and part ID scanners or photoeyes, and positioner and reciprocator scanners.

- Ethernet switch installed in scanner junction box

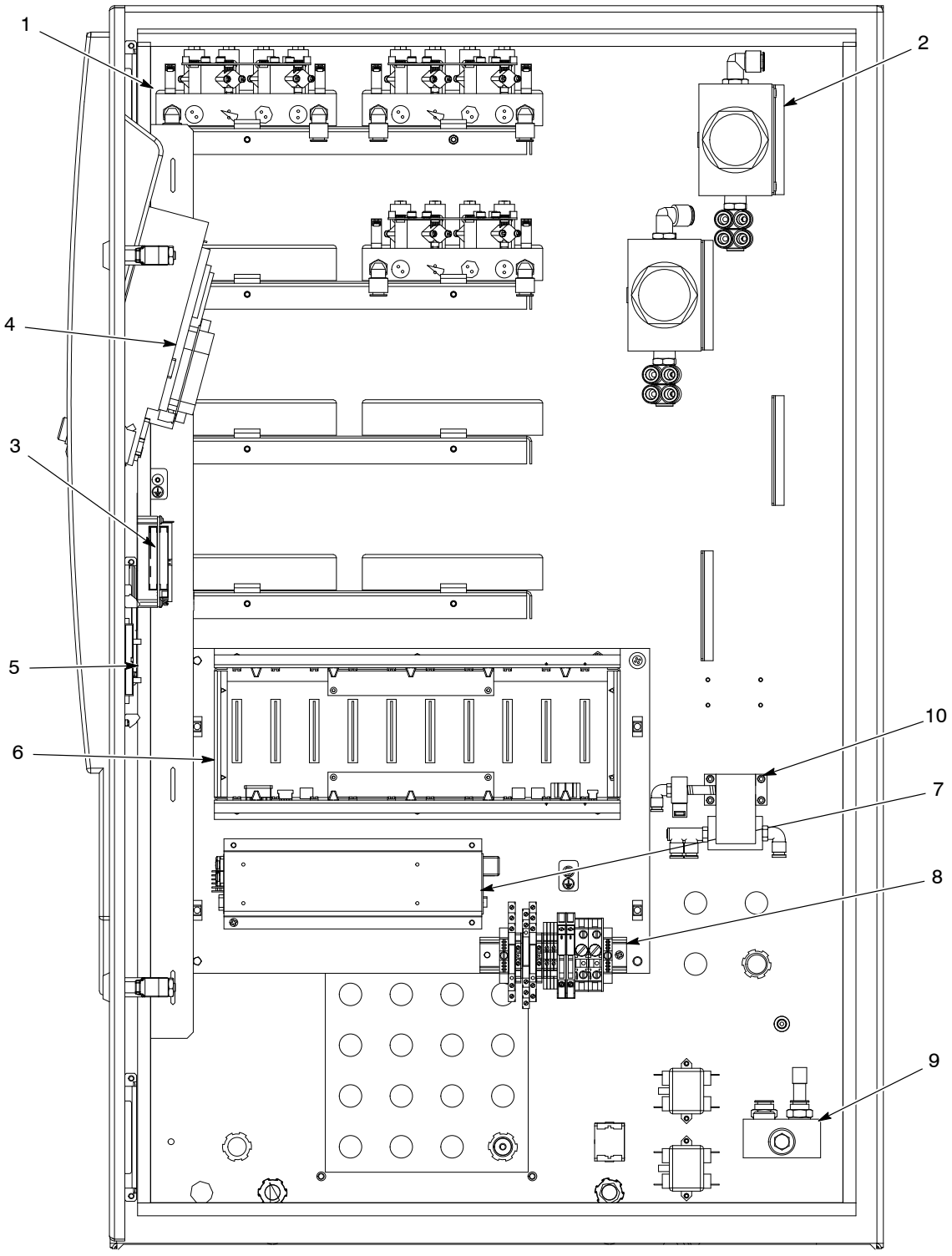


Figure 2-2 iControl Master Console Internal Components (Shown with Door Opened 90°)

1. iFlow digital airflow modules
2. Regulators
3. CompactFlash cards
4. Computer and LCD display
5. I/O board
6. Card cage, backplane, gun control cards
7. Power supply
8. Relays and terminal block
9. Air manifold
10. Purge kits (optional)

Operator Interface

The iControl software provides a graphical user interface that provides screens to configure and control the spray gun triggering and positioning system.

The operator performs all configuration and operation tasks with the touch screen and the **Rotary Dial**. Turning the rotary dial increases or decreases values in selected fields.

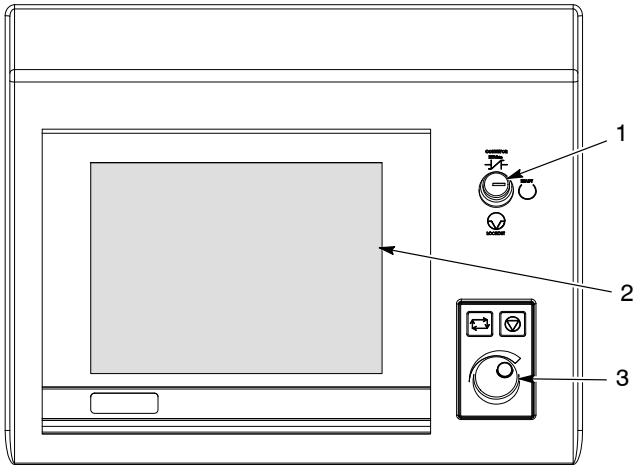


Figure 2-3 Master Console Front Panel

1. Interlock keyswitch
2. LCD touch screen
3. Rotary dial

Interlock Keyswitch Functions

In the **Ready** position, the spray guns cannot be triggered unless the conveyor is running. This prevents powder waste and hazardous operating situations.

In the **Bypass** position, you can trigger the guns on and off without running the conveyor. Use the Bypass position to set up and test spray gun settings.

In the **Lockout** position, the guns cannot be triggered and the in/out positioners and reciprocators cannot be moved. Use this position when working inside the booth. The lockout can be overridden for the in/out positioners and reciprocators from their configuration screens.

CAN and Ethernet Networks

Refer to the system diagrams in Section 7.

CAN Network: Handles communications between the gun control cards, iFlow modules, and the iControl PC, and with other iControl consoles.

Ethernet Network: Handles communications between the iControl system and remote devices such as optional in/out positioners, reciprocators, and scanners.

Digital Inputs

The iControl master console includes an interface board that provides optically isolated digital inputs. Included are

- eight inputs for zone detection
- eight inputs for part identification
- one input for a conveyor motion encoder
- one input for a conveyor interlock

The encoder and the devices (photoeyes or scanners) or customer inputs used for zone and part ID detection are connected to a terminal block in the Photoeye Junction Box (PEJB). A 24Vdc power supply in the PEJB provides power for these devices.

A 25-conductor input cable connects the PEJB to the iControl master console. If the master console cannot be located within direct wiring range (19 ft) of the PEJB, an extension box and extra cable is provided. If the system is equipped with a remote I/O (Ethernet) network, then the 25-conductor cable is routed through a network junction box.

Encoder

The iControl system provides one optically isolated digital input for a conveyor motion encoder. The encoder can be either mechanical or optical and must have a 50% duty cycle.

Resolution: At an encoder resolution of one inch to one pulse (1:1), the effective distance parts can be tracked by the iControl system is approximately 1333 feet. At a 2:1 resolution ($^1/_2$ inch per pulse), the effective tracking distance is halved, to approximately 666 feet.

The maximum speed of the encoder input is 10 Hz (10 pulses per second). This may require a trade off between desired conveyor speed and part tracking resolution (the higher the conveyor speed the coarser the tracking resolution).

NOTE: A timer may be used instead of an encoder. Consult with your Nordson representative.

Gun Control Cards

Each gun control card in the card cage provides electrostatic controls for two powder spray guns. The cards provide 0–21 Vdc power to the Sure Coat and Versa-Spray gun voltage multipliers and process feedback from the guns for display on the operator interface.

For Tribomatic guns, the cards monitor the current feedback and provide the operator with a reading indicating the electrostatic charge generated in the guns.

iFlow Digital Flow Modules

The iControl system controls air flow to the spray gun powder pumps, providing a more consistent and steady flow of powder to the spray guns than systems that control air pressure. The flow controls consist of the precision regulators and iFlow digital flow modules mounted in the iControl enclosure.

One regulator supplies air to two iFlow modules. Each module supplies flow-rate and atomizing air to two powder pumps, plus gun air (electrode wash air) to two spray guns. Flow-rate and atomizing air is turned on and off when the spray guns are triggered on and off.

The modules provide closed-loop control of flow-rate and atomizing air flow, constantly sensing the output and adjusting it to maintain air flow at the preset settings. The regulators provide air at a constant pressure to the air flow modules so the closed-loop control can operate at the calibrated range. The regulators are set 5.86 bar (85 psi) at the factory—do not change their settings.

Maximum output per powder pump is 13.6 m^3/hr (8 scfm). Each channel (flow or atomizing air) has a maximum output of 6.8 m^3/hr (4 scfm).

Two solenoid valves on the modules control the flow of gun air (electrode wash air) to the spray guns. The air flow is regulated by a fixed-orifice restrictor at the output. The solenoids can be set to turn on and off as the guns are triggered or for continuous flow.

Communication between the iFlow modules and the iControl PC is through the CAN network.

Specifications

General

Air Pressures	
Input	6.2–7.6 bar (90–110 psi)
Supply air hose	$^3/_4$-in. ID minimum
Maximum output per pump	13.6 m^3/hr (8 scfm)
Maximum output per channel (flow-rate, atomizing)	6.8 m^3/hr (4 scfm)
Gun air (electrode wash)	0.36 m^3/hr (0.2 scfm)
Electrical Requirements	
Input	Unswitched: (PC) 100–230 Vac, 50/60 Hz, 1 ∅, 120 VA max.
	Switched: 100–230 Vac, 50/60 Hz, 1 ∅, 600VA max.
	Conveyor Interlock and Remote Lockout: 120/230 Vac, 50/60 Hz, 1 ∅, 6 mA
	Alarm Relay contact rating: 120/230 Vac, 1 ∅, 6 A
Output (to spray gun)	0–21 Vdc, 0.60 A
NOTE: The iControl system must be interlocked with the fire detection system so that the spray guns are shut off if a fire is detected inside the spray booth.	
ANSI/ISA S82.02.01	
Pollution Degree	2
Installation (Overvoltage)	Category II
Environmental	
Operating Temperature	32–104 °F (0–40 °C)
Operating Humidity	5–95%, non-condensing
Hazardous Location Rating	North America: Class II Division 2, Groups F & G
	European Union: Ex II 3D

Air Quality

Air must be clean and dry. Use a regenerative desiccant or refrigerated air dryer capable of producing a 3.4 °C (38 °F) or lower dew point at 7 bar (100 psi) and a filter system with prefilters and coalescent type filters capable of removing oil, water and dirt in the submicron range.

Recommended Air Filter Screen Size:	5 micron or smaller
Maximum Oil Vapor in Air Supply:	0.1 ppm
Maximum Water Vapor in Air Supply:	0.48 grains/ft^3

Moist or contaminated air can cause the iFlow modules to malfunction; the powder to cake in the feed hopper, or clog the pump venturi throats, feed hoses, and spray gun powder paths; and cause grounding or arcing inside the spray gun.

Approvals

CSA, FM, CE / ATEX
Rated for Class II Division 2, Groups F & G Hazardous Location Area (North America), or Normal Usage Area, Zone 22 (European Union)

Approved Program and User Data Cards

SanDisk, Toshiba, PNY, and Memorex 128 Mb (minimum) CompactFlash cards.

Section 3
Installation

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

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

Introduction

iControl systems are configured for each customer's application and requirements. The equipment supplied with the system varies depending on the type of installation (new, upgrade, or retrofit) and the equipment furnished by the customer. Therefore, this section provides only basic installation information. Detailed information is contained in the system wiring diagrams, plan views, and other documentation furnished by Nordson application engineering.

Refer to Section 7 for system diagrams and console, junction box, and control panel drawings.

Once all hardware is installed and wired and the system is powered up, the operator interface is used to configure, setup, and operate the system. Refer to the *iControl Operator Interface* manual for configuration instructions.

WARNING: Use dust-tight conduit connectors or strain reliefs in all iControl console, junction box, and control panel knockouts. Installation must be done according to code and care must be taken to maintain the dust-tight integrity of the enclosures.

CAN Network Connections

Master and slave iControl consoles communicate through a CAN network. See Figure 3-1 for connections.

The CAN cable is installed in a separate conduit. Route the conduit to the slave console and connect the cable as shown.

Make sure all console and flow module address and termination switch settings are as described in *Console Address and Termination Settings* and *iFlow Module Address Settings* in this section.

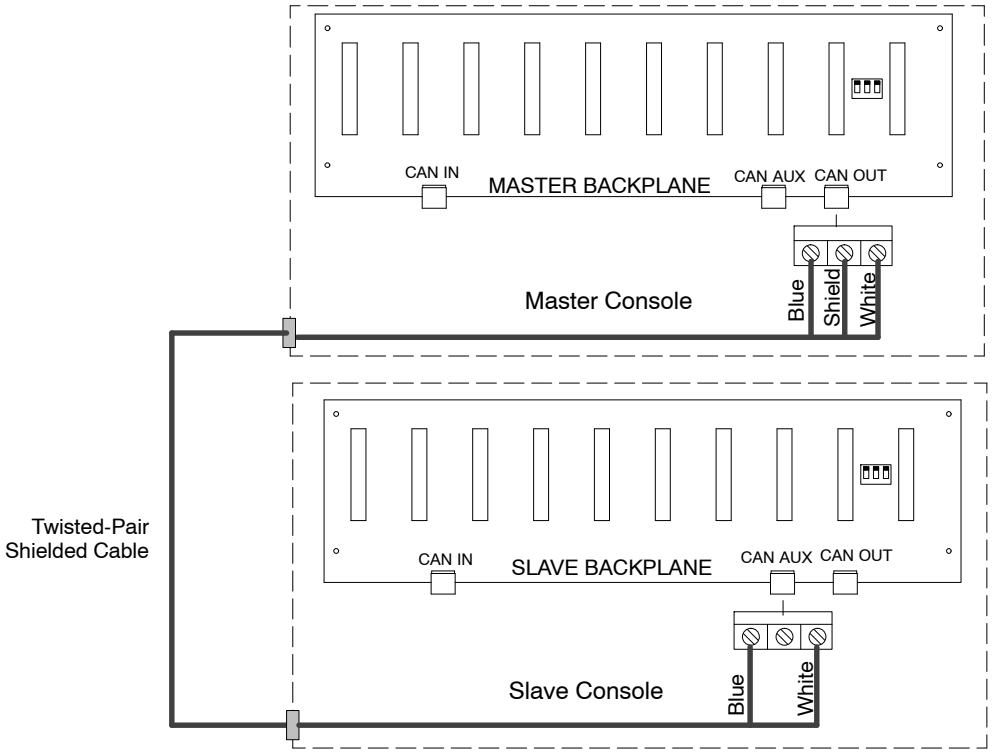


Figure 3-1 CAN Network Cable Connections

Console CAN Network Address and Termination Settings

See Figure 3-2.

The CAN network terminator dipswitch and console address dipswitches on the backplane must be set properly.

Network terminator dipswitch:

- Master console only: Set the network terminator to END (SW1–3 closed)
- Master and slave console: Set the master console to CONTINUOUS (SW1–3 open) and the slave console to END (SW1–3 closed).

Network address dipswitch:

- Set the master console to 1 (SW1–1 closed, SW1–2 closed).
- Set the slave console to 2 (SW1–1 closed, SW1–2 open).

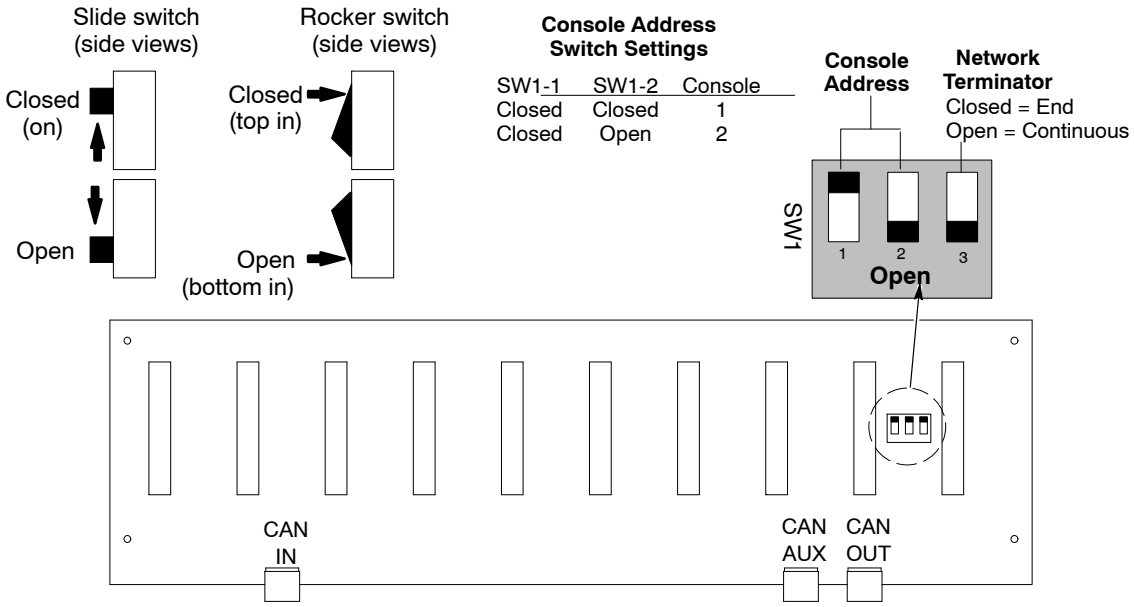


Figure 3-2 CAN Network Connections, Console Addresses, and Termination

iFlow Module Dipswitch Settings

The dipswitches on the iFlow digital flow modules set:

- gun air flow triggering
- console address
- module address

Each iFlow module must have a unique network address. The system will not be able to operate flow modules with duplicate addresses, and will notify the operator if it detects two modules with the same address.

The module address consists of the console number (1 or 2) and the number of the module (1–8) within the console.

See Figure 3-3 and Table 3-1.

Air Flow (SW4–1, 2)
Sure Coat guns– Set switches 1 and 2 to Continuous (down).
Versa-Spray guns with gun air option– Set switches 1 and 2 to Trigger (up).

Console Address (SW4–3, 4): Set switches 3 and 4 to the console address, which is the same as the address set at the backplane dipswitch shown in Figure 3-2.

Module Number (SW3): Set the rotary dipswitch on each module to the correct module number. The modules are numbered as shown in the module arrangement chart in Figure 3-3.

Table 3-1 Flow Module SW4 Dipswitch Settings

Gun Air			Console Address		
SW4–1 (Gun A)	**SW4–2 (Gun B)**	**Air Flow**	**SW4–3**	**SW4– 4**	**Console**
Down	Down	Continuous	Up	Up	1 (master)
Up	Up	Trigger	Up	Down	2 (slave)

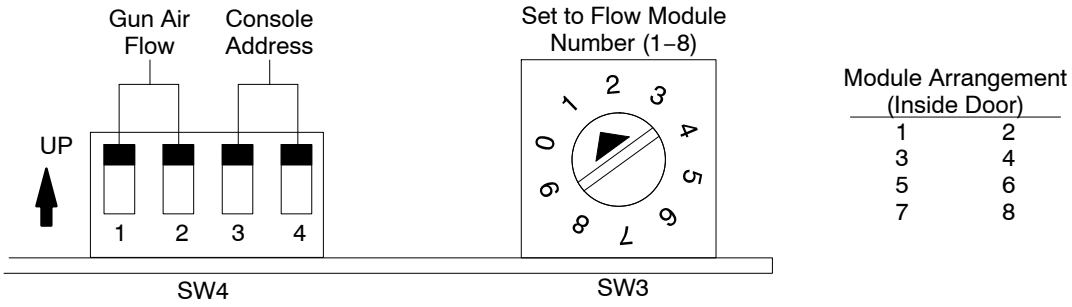


Figure 3-3 iFlow Module Address

Power, Ground, and Relay Connections

The console and junction box power cable ground wires must always be connected to a true earth ground. The special flat braided ESD ground cables provided with the iControl consoles and manual gun controllers must be used to connect them to the booth base if possible. Refer to *Grounding* on page 3-6 for more information.

WARNING: Consoles and all conductive equipment in the spray area MUST be connected to a true earth ground. Use the provided ground cables to ground the consoles. Mount the junction boxes and control panels to grounded stands or the booth base. Failure to observe this caution could result in severe shocks to personnel, fire, or explosion.

Table 3-2 lists the connections required for console power, chassis ground, remote lockout, alarm contacts, and conveyor interlock. Refer to page 3-11 for optional junction box and control panel power requirements.

Refer to Section 7 for the system diagram, console wiring diagrams, and junction box and control panel drawings. Refer to your system electrical drawings for all other power and ground connections.

iControl Console Power Cable Connections

Table 3-2 Master and Slave Console Power Cable Connections

Master Console Power Cable Connections (A)		
Wire Color	**Connection**	**Function**
Black	L1 (hot)	100–240 Vac power to SBC (master console only) (unswitched)
White	L2 (neutral)	
Brown	L1 (hot)	120–240 Vac power to console power supply (master and slave consoles) (switched with booth exhaust fan motor)
Blue	L2 (neutral)	
Green/Yellow	Chassis Ground (master and slave consoles)	
Gray (2)	Remote Lockout: 120 Vac, 1 phase, 6 mA (for 240 Vac, refer to instructions below)	
Yellow (2)	Alarm contacts: 120/230 Vac, 1 phase, 6 A max. Closed with no power to console or alarm is present. Open with power applied to console and no alarms present.	
Red, Orange	Conveyor Interlock: 120 Vac, 1 phase, 6 mA (for 240 Vac, refer to instructions below)	
Slave Console Power Cable Connections (B)		
Wire Color	**Connection**	
Blue	L1	
Brown	L2	
Green/Yellow	GND	

Conveyor Interlock and Remote Lockout Relay Connections

The conveyor interlock and remote lockout relays in the console are wired for 240 volts. To switch to 120 volts refer to Figure 3-4 for old style relays or 3-5 for new style relays. Do not remove the 20K resistors.

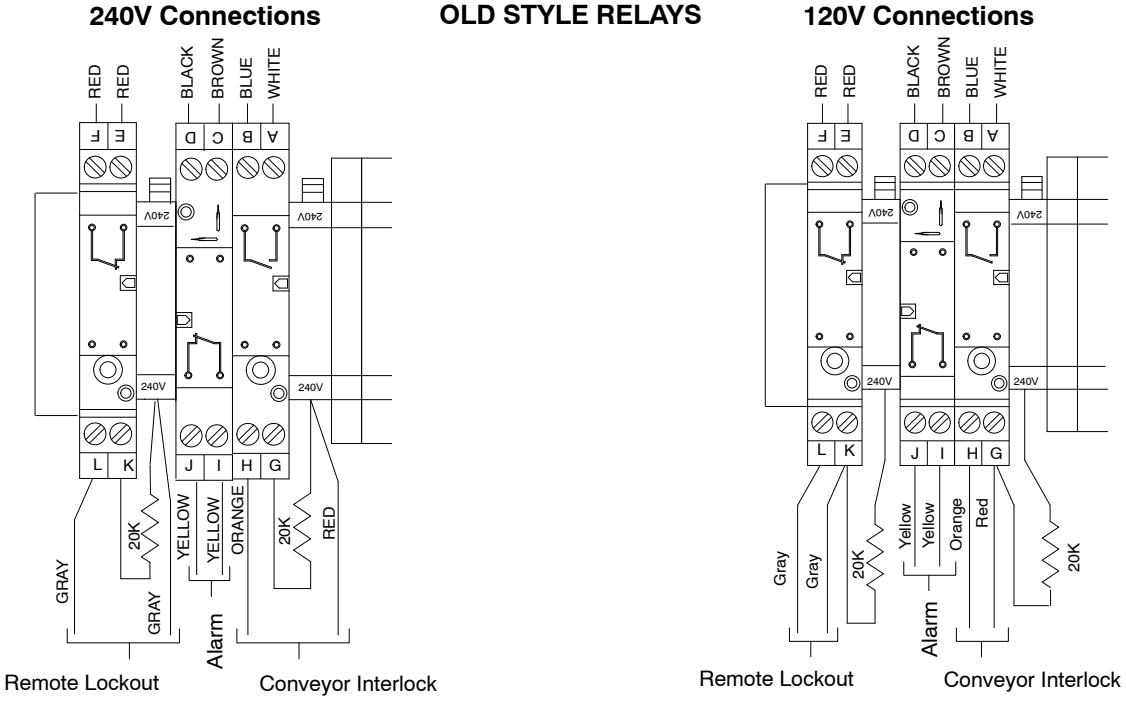


Figure 3-4 240Vac Conveyor Interlock and Remote Lockout Connections – Old Style Relays

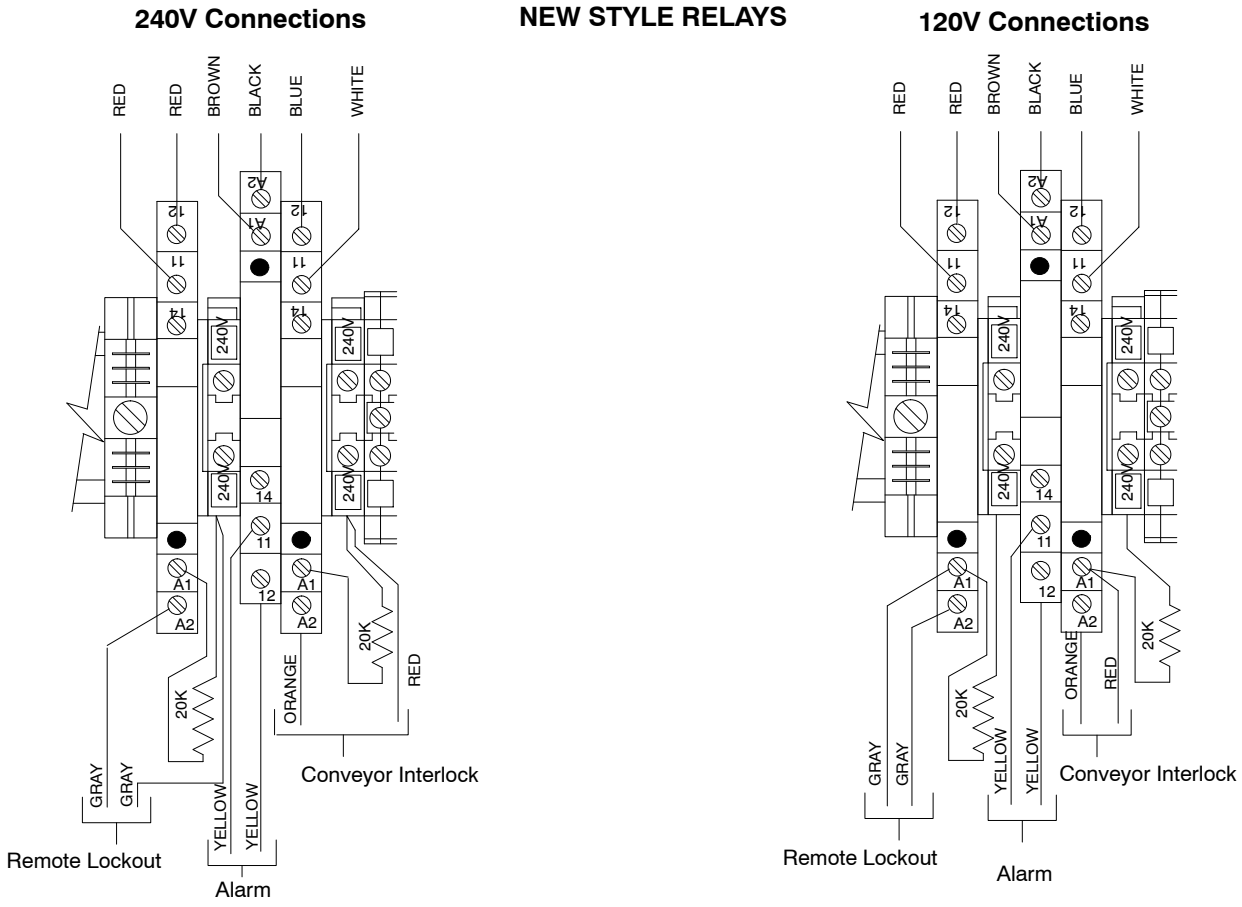


Figure 3-5 240Vac and 120Vac Conveyor Interlock and Remote Lockout Connections – New Style Relays

Grounding

Proper grounding of all conductive components of a powder coating system provides both shock and electrostatic discharge protection for both operators and sensitive electronic equipment. Many system components (booth, collector, color modules, control consoles, and conveyor) are connected both physically and electrically. It is important that the proper grounding methods and equipment are used when installing and operating the system.

PE (Protective Earth) Grounding

PE grounding is required on all conductive metal electrical enclosures in a system. PE grounding is provided by a ground conductor wire bonded to a true earth ground. PE grounding protects operators from electrical shock by providing a path to ground for electrical current if a conductor contacts an electrical enclosure or other conductive component. The ground conductor wire carries the electrical current directly to ground and short circuits the input voltage until a fuse or circuit breaker interrupts the circuit.

The green/yellow ground wires bundled with the AC input power cable are used only for PE grounding and their sole purpose is to protect personnel from a shock. These ground wires do not protect against electrostatic discharge.

Electrostatic Grounding

Electrostatic grounding protects electronic equipment from damage caused by electrostatic discharges (ESD). Some electronic components are so sensitive to ESD that a person can deliver a damaging static discharge without feeling even a mild shock.

Proper electrostatic grounding is mandatory in an electrostatic powder coating system. Powder spray guns generate electrostatic voltages up to 100,000 volts. It does not take long for ungrounded system components to build up an electrical charge strong enough to damage sensitive electronic components when discharged.

Electrostatic discharges occur at very high frequencies, around 100 megahertz. An ordinary ground conductor does not conduct such high frequencies well enough to prevent damage to electronic components. Special flat braided cables are provided with your Nordson powder coating equipment to protect against ESD.

Gun Current Path

Refer to Figure 3-6. All electrical circuits need a complete path for current to make its way back to the source (circle=circuit). Electrostatic spray guns emit current (ions) and therefore require a complete circuit. Some of the current emitted by the spray gun is attracted to the spray booth, but most is attracted to the grounded parts moving through the booth. The current attracted to the parts flows through the part hangers to the conveyor and to the building ground, back to the controller through a ground braid and back to the spray gun through the gun driver board. The current attracted to the booth is returned through the booth ground to the controller and back to the gun.

It is very important to provide a complete circuit for the gun current. A break in the circuit conductors (conveyor, booth, braided ground cables, controller) can cause voltage to build up on the conductors up to the maximum output of the spray gun voltage multiplier (up to 100 kV). The voltage will eventually discharge in a high frequency arc and cause damage to the controller electronics (gun driver board and power supply).

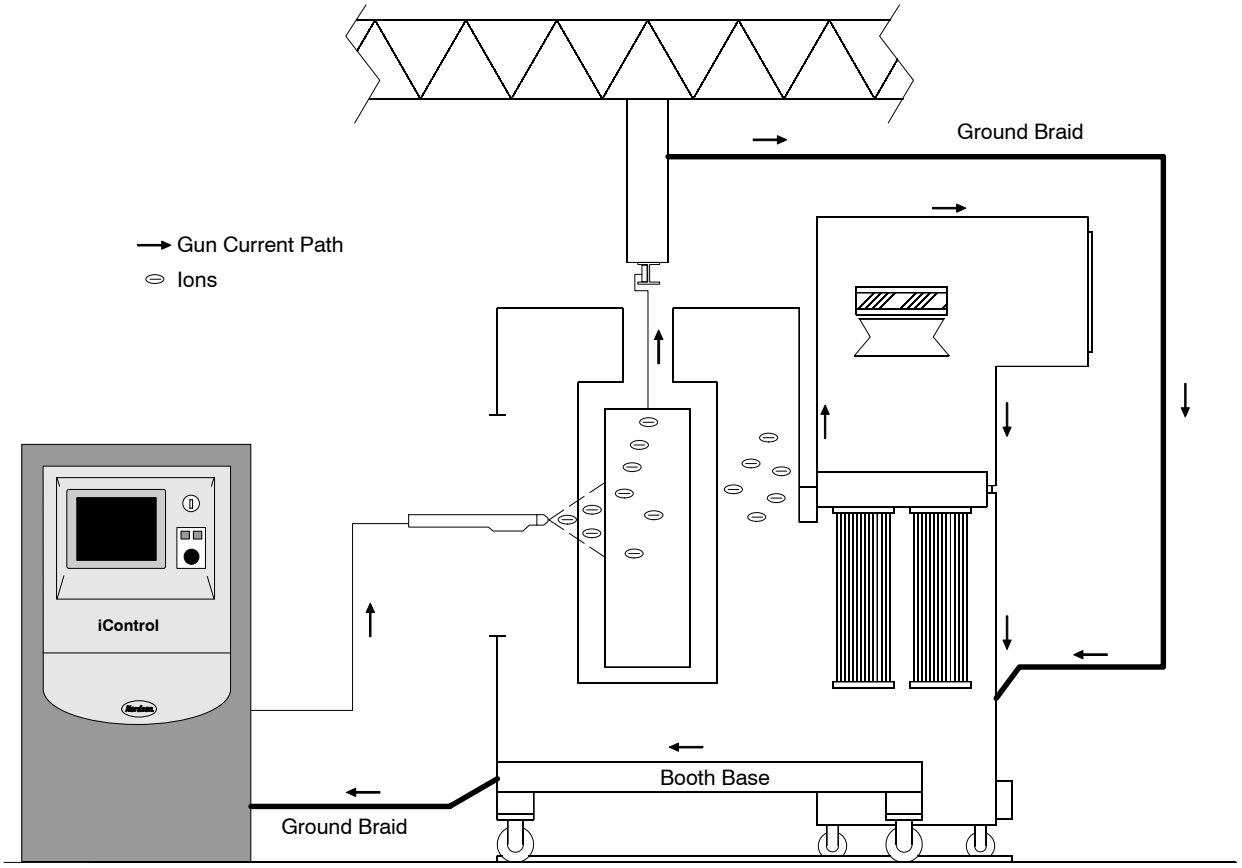


Figure 3-6 Electrostatic Current Path

ESD Ground Procedures and Equipment

The best protection against ESD is to keep the ground braids as short as possible and connect them to a central point on the booth base as shown in the Star diagram. Under normal conditions making Star connections is not a problem, but in some systems, such as roll-on/roll-off booths, the ground braids required for a Star connection are too long to be effective against ESD. In this case, a Daisy Chain ground configuration is acceptable.

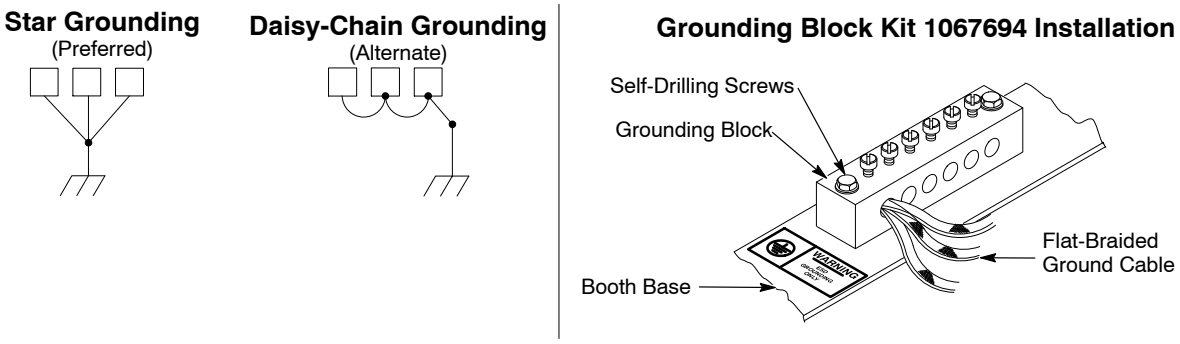


Figure 3-7 ESD Grounding Procedures and Equipment

Always use the special flat braided copper ESD ground cables furnished with all Nordson spray gun controllers to ground them. The ESD ground cables should always be attached to the welded booth base, not to a panel, enclosure, or other component bolted to the base. Keep the cables as short as possible. If using a grounding block kit, make sure the block is installed directly to the welded base with the included self-drilling screws.

An ESD grounding block kit is available for connecting the ground braids to the booth base. The kit contains two 6-position grounding blocks, fasteners, terminals, and 15 meters (50 feet) of braided ground cable. If additional kits are required, order:

1067694 Kit, ground bus bar, ESD, 6–position, with hardware

Encoder, Photoeye, and Scanner Connections

A 25-conductor cable carries the encoder and discrete part ID and zone input signals from the Photoeye Junction Box (PEJB) to the I/O board in the iControl master console. If these inputs are shared by a second booth then an additional 25-conductor cable is supplied. Table 3-3 lists the 25-conductor cable connections and functions. The connections to the junction box terminal strip must be made in the field.

Section 7 contains a system wiring diagram, console wiring diagram, and diagrams for the junction boxes and control panels listed in Table 3-3.

NOTE: Refer to your system plan views when locating the part ID stand and mounting the photoeyes or scanners.

Direct Triggering Option

Powder guns can be triggered in banks by an external controller through I/O board inputs 17, 18 and 19. Refer to the iControl Operator Interface manual, *Section 3 Standard System Configuration*, under *Zone Configuration* for more information on using these inputs.

Direct Triggering Banks

Input 17	Input 18	Guns
0	0	1–8
1	0	9–16
0	1	17–24
1	1	24–32

Once a bank is selected, it can be triggered by strobing (low-true logic) input 19. The guns will be triggered on and stay on until input 19 is strobed again.

Manual Lockout

To prevent the operator from manually triggering any guns manually through the iControl Operator Interface while direct triggering is being used, ground input 23.

25-Conductor Cable Connections

Table 3-3 Parallel Cable Connections: I/O Board to Junction Box Terminals (Inputs to I/O Board are Sinking)

Wire Color	I/O Board Terminal	Junction Box Terminal Number	Function
BLK	1 LO	1	Zone 1
WHT	2 LO	2	Zone 2
GRN	3 LO	3	Zone 3
ORG	4 LO	4	Zone 4
BLU	5 LO	5	Zone 5
WHT/BLK	6 LO	6	Zone 6
RED/BLK	7 LO	7	Zone 7
GRN/BLK	8 LO	8	Zone 8
ORG/BLK	9 LO	9	Part ID bit 1
BLU/BLK	10 LO	10	Part ID bit 2
BLK/WHT	11 LO	11	Part ID bit 3
RED/WHT	12 LO	12	Part ID bit 4
GRN/WHT	13 LO	13	Part ID bit 5
BLU/WHT	14 LO	14	Part ID bit 6
BLK/RED	15 LO	15	Part ID bit 7
WHT/RED	16 LO	16	Part ID bit 8
ORG/RED	17 LO	—	Trigger Bank 0
BLU/RED	18 LO	—	Trigger Bank 1
RED/GRN	19 LO	—	Trigger Bank Strobe
ORG/GRN	20 LO	20	Encoder A
BLK/WHT/RED	21 LO	—	Spare
WHT/BLK/RED	22 LO	—	spare
RED/BLK/WHT	23 LO	—	Manual Lockout
GRN/BLK/WHT	N/C	—	—
BLUE from Keyswitch	24 HI	Not Applicable	Conveyor Interlock
WHITE from Keyswitch	24 LO	Not Applicable	Conveyor Interlock
RED	1–23 HI	(+)	VDC

Switching Inputs to Sourcing

Inputs to I/O card in the iControl console are configured as sinking. 24 Vdc is applied to all HI terminals. To switch the inputs to sourcing:

1. Disconnect all wires from the I/O card LO terminals, except terminal 24. Do not remove the blue and white wires from terminals 24 HI and 24 LO.
2. Move the 6-pole jumpers from the HI terminals to the LO terminals.
3. Install the red wire jumpers to connect all 6-pole jumpers together.
4. Connect the red wire from the 25-conductor cable to terminal 1 LO.
5. Connect the remaining wires to the HI terminals.
6. At the PEJB, connect the red wire to the (–) terminal.

Conveyor Encoder Connections

Bring the encoder cable into the Photoeye Junction Box (PEJB) through a dust-tight conduit at one of the unused knockouts in the PEJB. Wire the cable to the encoder and PEJB terminal strip as shown on the PEJB drawing in Section 7.

Photoeye Connections

Connect SO cable to the photoeyes and photoeye junction box terminal block as shown on the PEJB drawing. Route the cables through the cord grips installed in the PEJB as shown.

Configure the photoeyes and set their sensitivity as shown on the PEJB drawing.

Junction Box and Control Panel Power Requirements

Table 3-4 Junction Box/Control Panel Power Requirements

Device	J-Box/Control Panel	Requirement
C	Photoeye (standard) (PEJB)	120–240 Vac, 1 PH, 50/60 Hz, 2A
D	Network Interface	120 Vac, 1 PH, 60 Hz, 11 watts
E	In/Out Positioner Scanner	24 Vdc from 30 Watt PEJB 120 Vac (fused), from PEJB (if 2nd booth option)
F	In/Out Positioner Control	120 Vac, 1 PH, 60 Hz, 10A
F	Analog (Retrofit) In/Out Positioner Control	120 Vac, 1 PH, 60 Hz, 2A
G	In/Out Positioner / Reciprocator Control	120 Vac, 1 PH, 60 Hz, 10A 208–575 Vac, 3 PH, 60 Hz (see foldouts Fig. 7-25)

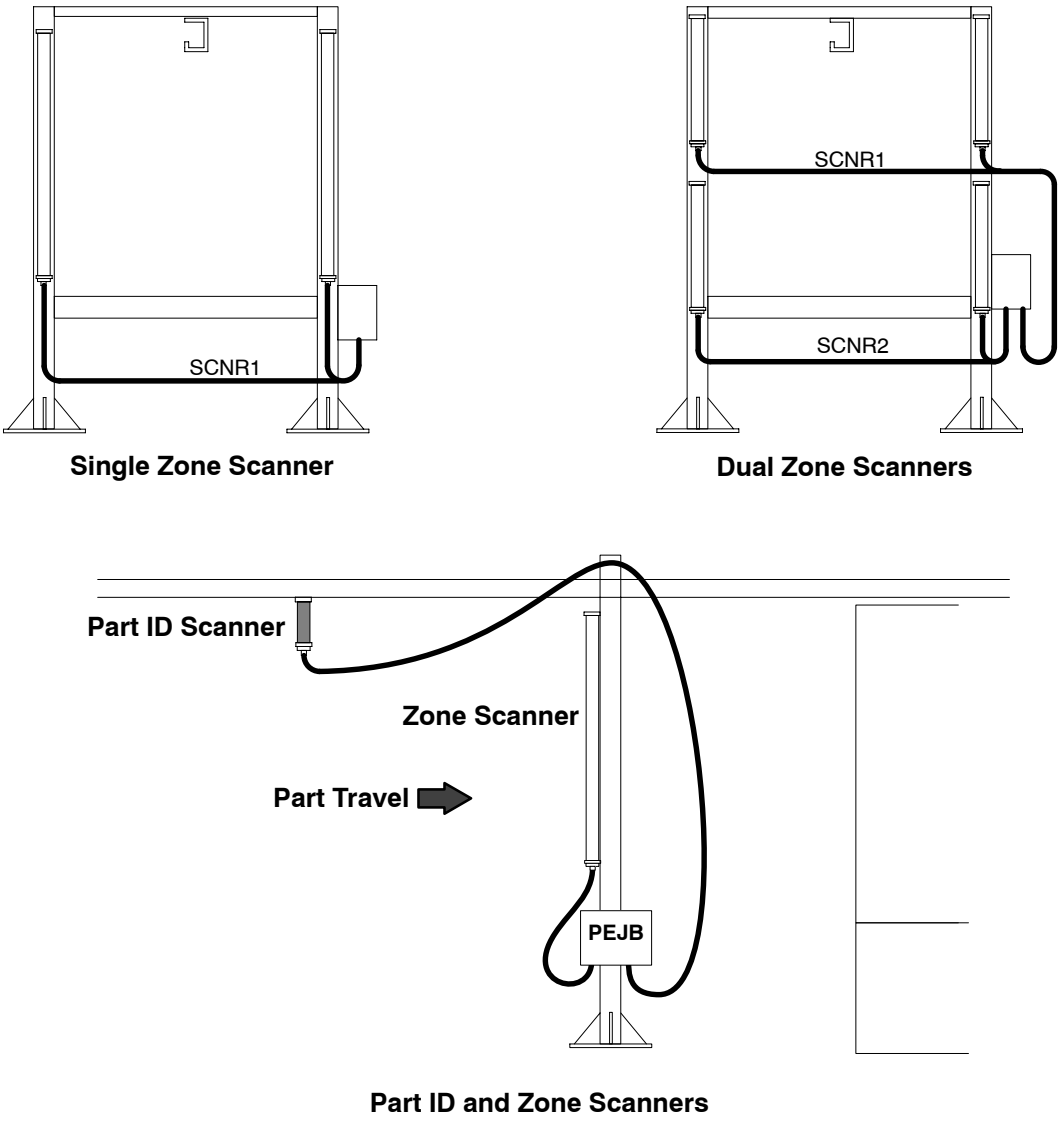
Scanner Cable Connections

See Figure 3-8. The photoeye junction box and scanner junction boxes are shipped with the scanner cables pre-wired to the junction boxes. The scanner controllers are programmed at the factory according to the system order specifications. Refer to your system plan views when locating the part ID stand and scanners or photoeyes. The scanners must be mounted with the cable ends oriented as shown.

Discrete Scanner Connections

- Single Zone Scanner: SCNR1 cables to scanner.
- Dual Zone Scanners: SCNR1 cables to upper scanner, SCNR2 cables to lower scanner.
- Part ID Scanner and Zone Scanner: SCNR1 cables to zone scanner, SCNR2 cables to Part ID scanner.

NOTE: The part ID scanner or photoeyes must be located so that the iControl system receives the part ID before the leading edge of the part breaks the zone scanners or photoeyes.



Single Zone Scanner

Dual Zone Scanners

Part ID and Zone Scanners

Figure 3-8 Zone and Part ID Scanner Cable Connections (Typical)

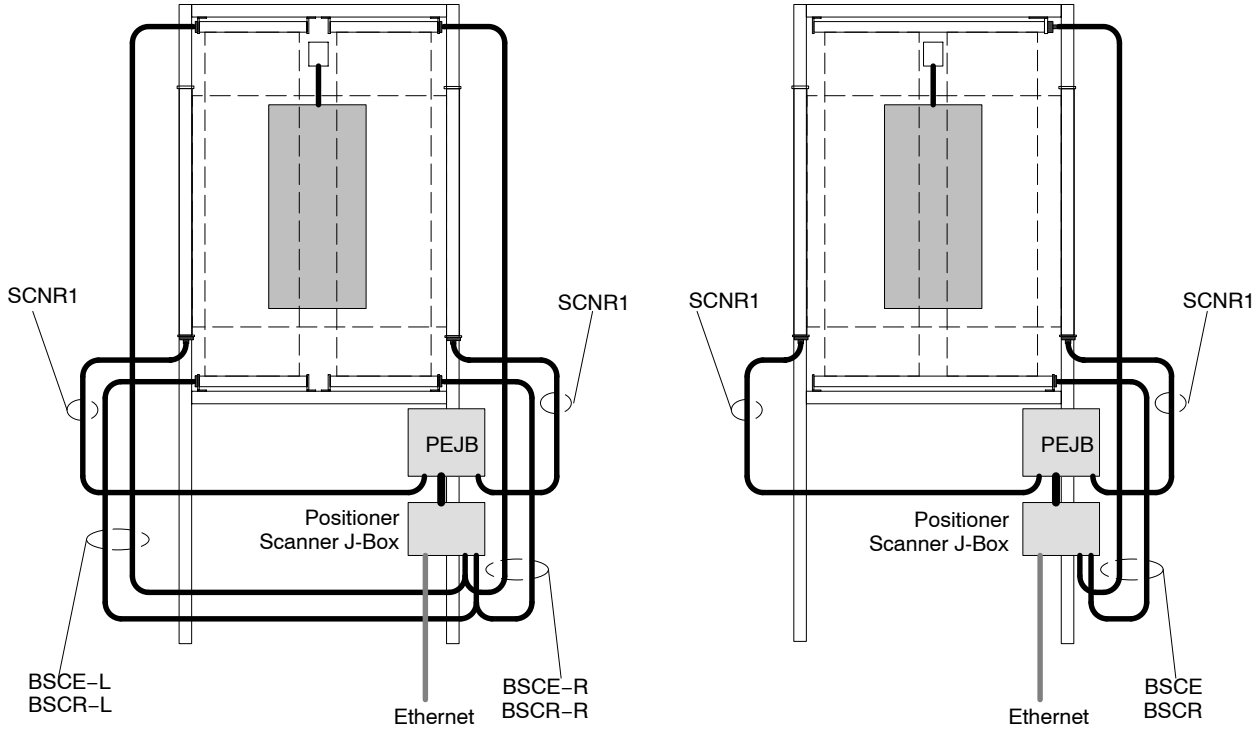
Analog Scanner Connections

See Figure 3-9. If the system includes in/out positioners, then one or two analog scanners are mounted horizontally on the stand to detect the part width. The in/out positioner scanner junction box is typically located on the light stand. The scanners must be mounted with the cable ends oriented as shown. If using dual scanners, mount them so that they do not see the conveyor. Connect the scanner cables (BSCE, BSCR) from the junction box to the scanners as shown.

If the system also has reciprocators, then analog scanners are used to detect the part height and top and bottom edges. Mount the scanners with the cable ends down and connect the cables (SCNR1) from the junction box to the scanners.

Maximum Emitter/Receiver Separation:
6 meters (20 ft) if scanner is less than 1.22 meters (4 ft) long
4.6 meters (15 ft) if scanner is greater than 1.22 meters (4 ft) long.

NOTE: If using a single horizontal scanner, the controller must be programmed to ignore the conveyor. This requires software from the scanner manufacturer, a laptop running Windows, and a serial cable to connect the laptop to the scanner controller in the junction box.



Dual Positioner Scanner Configuration **Single Positioner Scanner Configuration**

Figure 3-9 System Wiring – In/Out Positioner Scanner Connections

Customer-Supplied Part ID System Connections

Refer to Table 3-3 on page 3-10. Use the Part ID terminals on the Photoeye Junction Box to connect a customer-supplied part ID system to the iControl console. The 8 inputs are used based on the settings made in the Photoeye Configuration screen. Refer to the *iControl Operator Interface* manual for configuration instructions.

Ethernet Network Connections

The Ethernet network allows the iControl system to communicate with remote Ethernet devices such as the in/out positioner or reciprocator controllers and the Ethernet couplers that receive signals from the analog scanner controllers.

NOTE: Do not connect any device to this network that is not approved by Nordson Finishing Technical Support or Engineering.

The required field connections are shown in Figure 3-10, along with the connections required for sharing the in/out positioner scanner with a 2nd booth. Refer to Section 7 for junction box and control panel drawings.

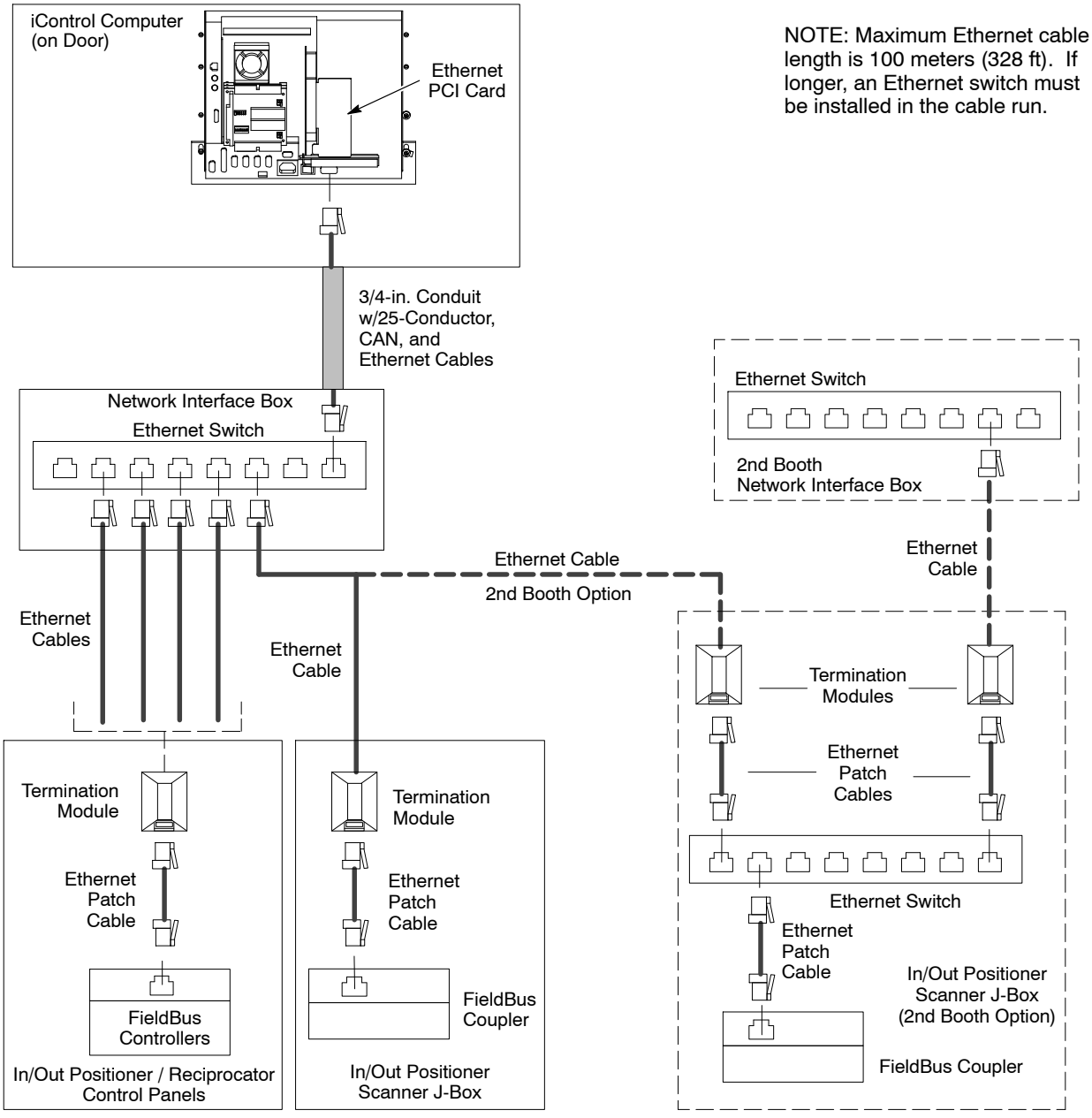


Figure 3-10 Remote I/O Network Equipment and Connections (with Connections for 2nd Booth Option)

iControl Console to Network Interface Box

Connect the 3/4 in. flexible conduit to the network interface box if you have not already done so. Plug the Ethernet cable bundled in the conduit to any unused port in the Ethernet switch. The other end of the cable is plugged into the iControl PC Ethernet card.

Ethernet Switch to Ethernet Devices

NOTE: There are two Ethernet cable types, T568-A and T568-B. The type determines the way the cable leads are wired at each end of the cable. Either type of cable can be used in the iControl system. **Each end of the cable must be terminated using the same wiring arrangement.**

Refer to the *Parts* section for 100- or 300-foot T568-B Ethernet CAT 5e cables. Use these cables to connect the Ethernet switch in the network junction box to the Ethernet controllers in the junction boxes and control panels.

1. Measure the lengths needed plus enough slack at each end so that you can pull the cables into the junction boxes and then connect the cables to termination modules or RJ-45 plugs.
2. Cut the cables to length, leaving an RJ-45 plug on one end.
3. Pull the cut ends of the cables through flexible conduit from the network interface box to the junction boxes or control panels.
4. In the network interface box, plug the cables into the Ethernet switch.
5. At the junction boxes or control panels terminate the cables with one of these methods:
   - Each junction box or control panel includes a termination module and patch cord. Install the termination modules on the end of the cables as described in *Connecting Termination Modules to Ethernet Cables* on page 3-16, then use the patch cords to connect the termination modules to the Ethernet controllers.
   - Install RJ-45 plugs on the ends of the cables as shown in *Ethernet Termination Standards* on page 3-18 and plug the cables into the Ethernet controllers.

NOTE: It is a good idea to test all cables with an Ethernet continuity tester before connecting them. Refer to *Troubleshooting* for test procedures.

MAC Addresses

Record the MAC address and device function for each Ethernet controller in the junction boxes and control panels. For the in/out positioners note the location (left front = GM1, right front = GM2, left rear = GM3, right rear = GM4). The MAC addresses are on the controller labels, in the form 0:30:DE:0:33:C8.

You will need the MAC addresses when configuring the network with the iControl operator interface. Refer to the *iControl Operator Interface* manual for instructions.

Connecting Termination Modules to Ethernet Cables

iControl junction boxes and control panels containing Ethernet devices are equipped with T568-B Ethernet termination modules and 2-foot T568-B patch cords. To connect the termination modules to the Ethernet cables coming from the network junction box, you will need a cable jacket stripper, a 110 punch-down tool, and a diagonal cutter.

- cable jacket stripper
- 110 punch-down tool
- diagonal wire cutter

See Figure 3-11.

1. Remove the surface mount box and termination module from the junction box.
2. Remove the cover and bezel from the surface-mount adapter. Use a small flat screwdriver to remove the old-style cover; squeeze the clips on each side of the new-style cover to remove it.
3. Remove the cable entry knockout from the cover.
4. Strip back the cable jacket no less than 50 mm (2 in.). Do not strip the wire insulation.
5. Keeping each pair twisted together, lay the wires one at a time into the module slots and punch them down, using the B color code as shown in the illustrations.

NOTE: A minimum of 6.4 mm ($^1/_4$ in.) of wire must extend beyond the module slot to ensure a good connection.

6. Clip off the ends of the wires close to the termination module so the ends of the wires cannot contact each other.
7. **Side-connect modules:** Slide the termination module into the adapter, then install the bezel onto the adapter.
   Rear-connect modules: Snap the termination module into the bezel, then install the bezel onto the adapter.
8. Secure the cable to the adapter with a cable tie.
9. Snap the adapter cover into place.
10. Locate the assembled surface mount box close enough to the fieldbus device to make the patch cable connection. Secure the adapter to the junction box with the included piece of two-sided adhesive tape.

Connecting Termination Modules to Ethernet Cables *(contd)*

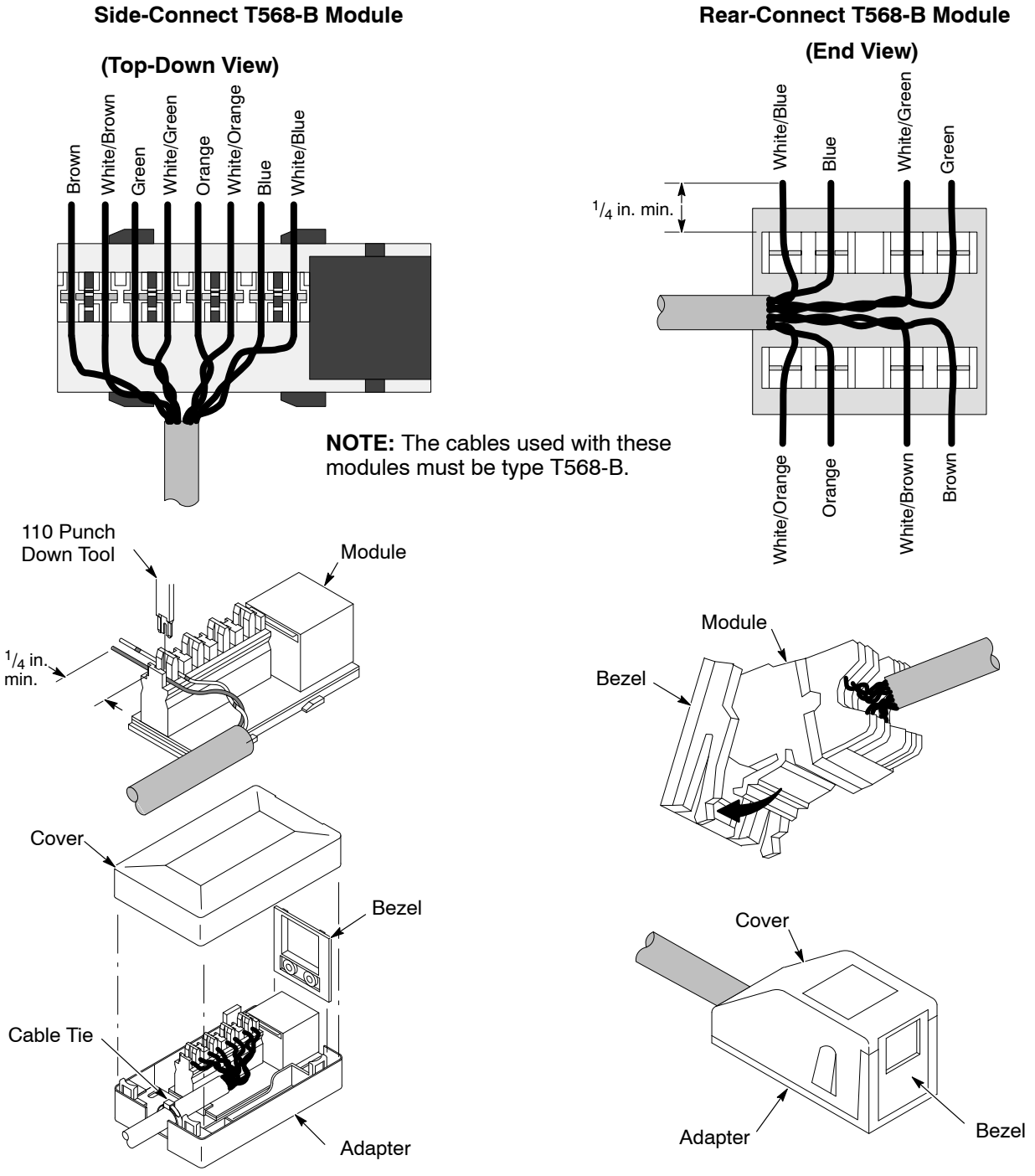


Figure 3-11 Connecting Ethernet Termination Modules to Ethernet Cable

Ethernet Termination Standards

Either T568-B or T568-A cables will work in the iControl system. Use the wiring diagrams in Figure 3-12 when terminating Ethernet cables. Make sure each end of the cable is terminated using the same type of plug and wiring arrangement.

Type T568-B Wiring Diagram

Pin	Color
1	Orange/White
2	Orange
3	Green/White
4	Blue
5	Blue/White
6	Green
7	Brown/White
8	Brown

Type T568-A Wiring Diagram

Pin	Color
1	Green/White
2	Green
3	Orange/White
4	Blue
5	Blue/White
6	Orange
7	Brown/White
8	Brown

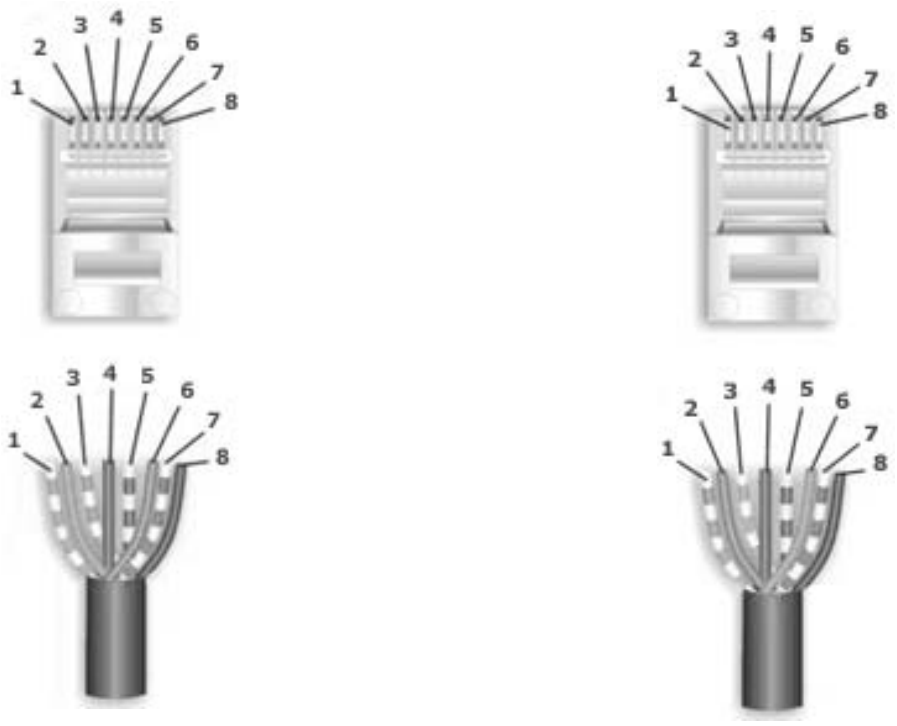


Figure 3-12 Ethernet Termination Standards

Gun Cable Connections

See Figure 3-13. Connect the automatic gun cables to the receptacles on the bottom rear panel of the iControl console. Connect gun 1 cable to receptacle 1, gun 2 cable to receptacle 2, and so on.

NOTE: If you are using Versa-Spray and Tribomatic guns, you must connect an adapter cable to each console receptacle, then connect the gun cables to the adapter cables. If you did not receive the necessary adapter cables with your system, refer to the *Parts* section of this manual to order the correct adapter cables.

Odd Number of Guns

iControl systems are sold configured for an even number of guns. Each gun controller card in the console controls two guns. If you configure the system for an odd number of guns, the fault LED on the card with only one gun connected will light.

NOTE: The unused gun must be the highest even-number gun. For example, if you have an 8-gun system, then number 8 must be the unused gun. The gun card receptacles are labeled on the circuit boards as A (odd number gun) and B (even number gun).

Included in the bag with the console keys is a seal and jumper. The jumper will disable the gun not detected fault LED on the gun card.

Cap the unused cable receptacle with the bulkhead seal, then open the console door and unplug the receptacle harness from the gun card. Install the jumper in the card receptacle.

Refer to the *Parts* section for seal and jumper part numbers.

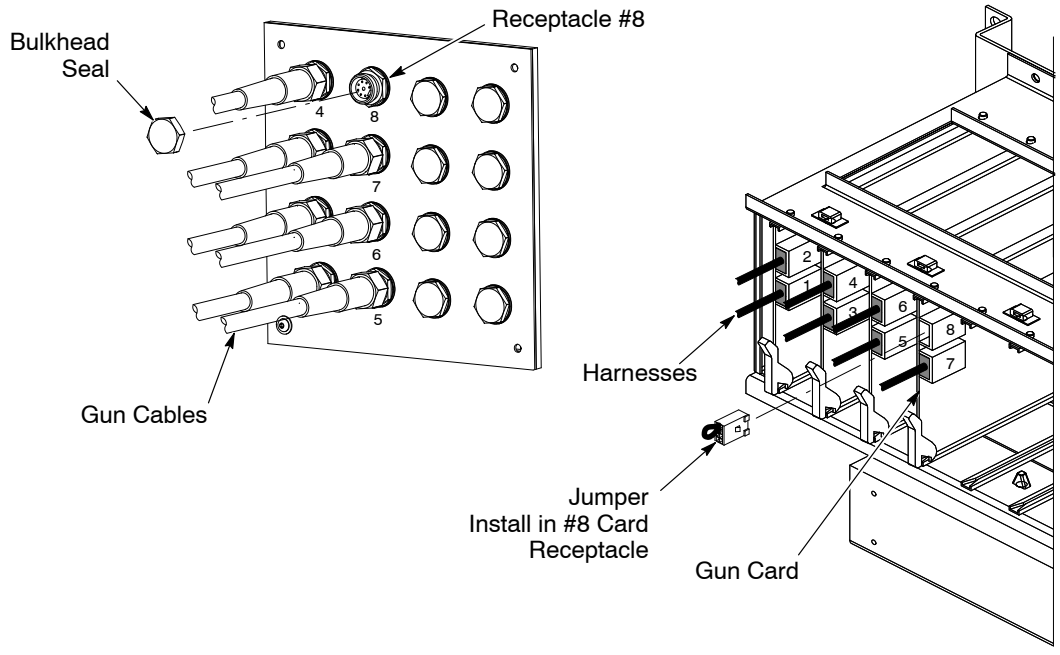


Figure 3-13 Seal and Jumper Installation – Example Showing 8 Gun System Using 7 Guns

Pneumatic Connections

Supply Air Requirements

Maximum input air pressure:	7.6 bar (110 psi)
Minimum input air pressure:	6.2 bar (90 psi)
Connection:	1-$^{1}/_{16}$–12 JIC, on rear panel
Air hose:	19 mm ($^{3}/_{4}$ in.) minimum ID

The compressed air supply must be clean and dry. Use prefilters and coalescent filters with automatic drains and a refrigerated or regenerative desiccant air dryer capable of producing a 3.4 °C (38 °F) dewpoint at 7 bar (100 psi). A 5-micron filtration system is recommended.

A five-foot air hose is provided with the console. Connect one end of the hose to the 1-$^{1}/_{16}$–12 JIC threaded male connector at the ball valve. Connect the other end of the hose to your air supply.

NOTE: If supplying air to both a master and slave console, run a separate hose to each console from the air drop. Do not daisy chain the air supply hoses from one console to the next. Doing so will affect the air supply to the second console.

Gun and Pump Air Connections

See Figure 3-14 for console gun and pump air connections and fitting layout.

Connect flow-rate and atomizing air tubing from the quick-disconnect fittings on the console to the spray gun pumps as follows:

- Flow-Rate: 8-mm **black** air tubing to pump fitting marked **F**.
- Atomizing: 8-mm **blue** air tubing to pump fitting marked **A**.

Connect the tubing so that gun 1 pump is connected to gun 1 console fittings, and so on.

Gun Air (Electrode Wash) Connections	
Gun Type	**Gun Air**
Sure Coat	Required
Versa-Spray	Optional(1)
Tribomatic	Not Used
(1) Versa-Spray guns can only use the gun air connection if the gun is equipped with a diffuser. Refer to your Versa-Spray gun manual for more information about the gun diffuser.	

If your spray guns use gun air, connect 4-mm clear air tubing from the gun air connectors on the console rear door to the spray guns. Make sure you connect the tubing correctly, so that gun 1 is connected to the gun 1 fitting and so on.

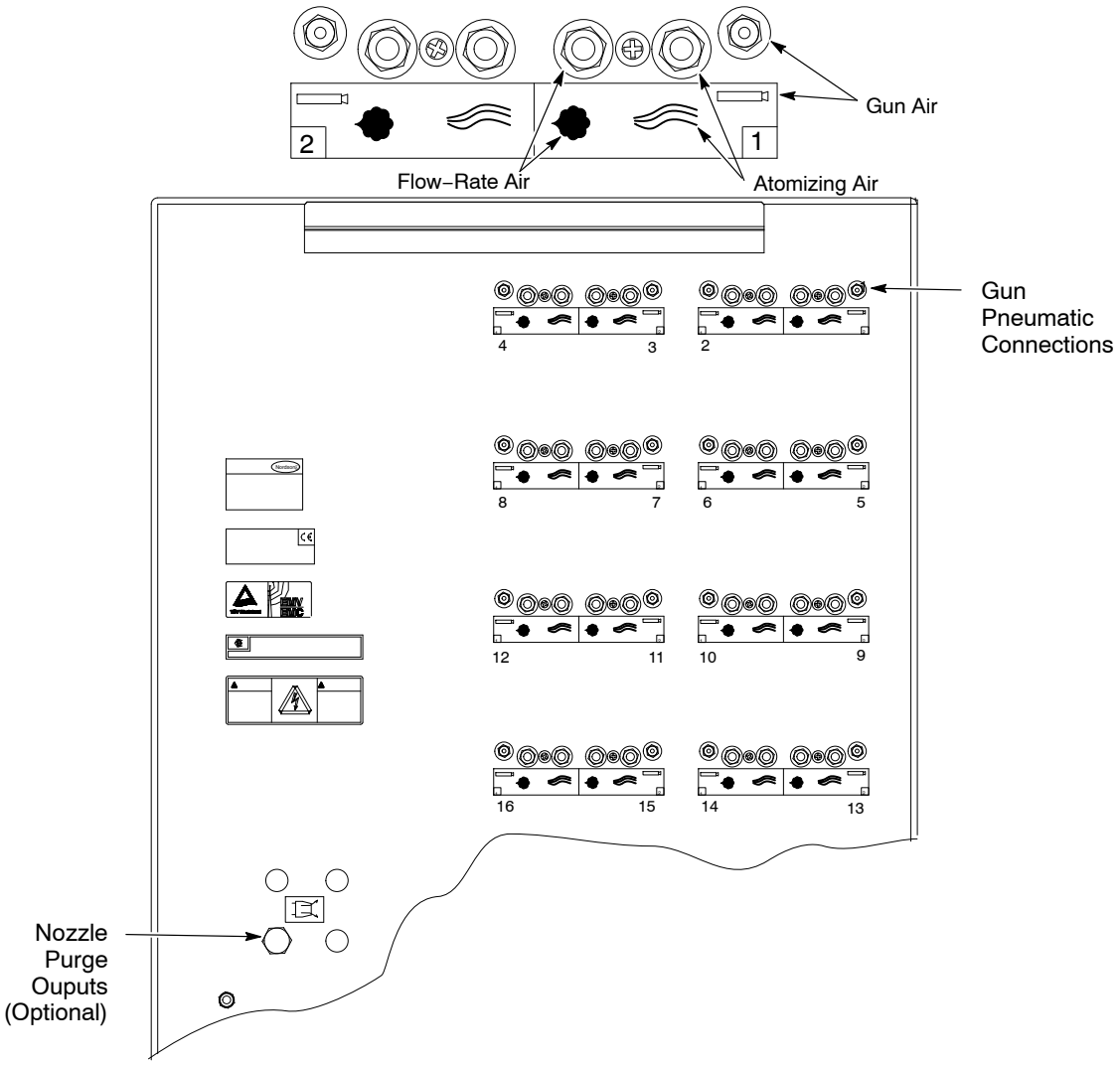


Figure 3-14 Console Rear Panel (Cover Removed)

Program and User Data Cards

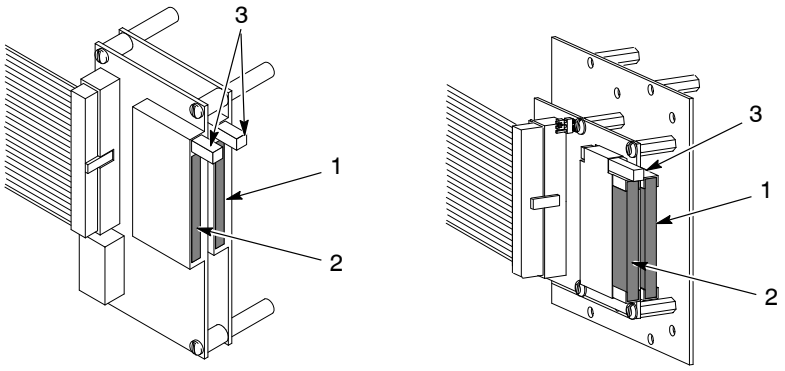
The iControl program and user configuration and preset data are stored on two 128 Mb CompactFlash cards. These cards function as removable hard drives. The iControl consoles are shipped with these cards installed.

CAUTION: The Compact Flash cards CANNOT be hot-swapped. Shut down the iControl program and operating system, then turn off the iControl console before removing the cards. Removing the cards while power is on could corrupt the data on the cards and damage the cards.

CAUTION: Never turn off console power without first shutting down the iControl program and operating system. Doing so could corrupt the system software. Refer to *Program Shutdown* in the *iControl Operator Interface* manual for the shutdown procedure.

The card adapter is mounted on the inside of the master console door. The inner card (1) is the data card; the outer card (2) is the program card.

NOTE: The old-style adapter had an eject button for each card; the new-style adapter has one button that ejects the program card and exposes the data card. To remove the data card, simply pull it out of the slot.



Old-Style Adapter New-Style Adapter

Figure 3-15 User Data and Program Card Locations

1. Data card
2. Program card
3. Eject button

The iControl program can be updated by installing a new program card.

In addition to the configuration data, up to 255 presets per gun can be stored on one data card. Additional cards will provide you with a virtually unlimited number of presets. To back up a data card use the Data Backup function. This copies the data to a blank card. Refer to *Data Backup* in the *iControl Operator Interface* manual for instructions.

NOTE: Not all CompactFlash cards are the same. If you purchase additional cards, make sure they are from a Nordson-approved manufacturer and are 128 Mb or greater. For approved cards, refer to *Specifications* in the *Description* section of this manual or contact your Nordson controls engineer or Nordson Technical Support.

Touch Screen Calibration

The touch screen is calibrated at the factory before the system is shipped. The touch screen calibration values are stored on the program card. If you install a new program card that has never been used before, there will be no calibration file on the card. The system will automatically start the calibration procedure.

Follow the calibration instructions on the screen exactly, using your finger to touch the targets. When you have completed the calibration procedure, touch the **iControl** button to start the iControl software.

Refer to *Troubleshooting* for a complete description of the calibration procedure and instructions on calibration.

System Upgrades

iControl systems can be upgraded by:

- adding additional guns to an existing console
- adding a slave console
- adding purge modules to a console used with Versa-Spray guns
- installing a new program flash card with updated software.

Certain upgrades require updates to the gun control card and iFlow module firmware. These upgrades should only be done by a Nordson representative.

Adding Guns to Existing iControl Console

Master and slave consoles are sold configured for 4, 6, 8, 10, 12, 14, or 16 guns. If your consoles were configured for less than 16 guns, additional guns can be added by ordering and installing the required parts listed below.

For each new gun added, use the requirements listed below to determine the components needed. The sum of the parts required for each gun equals the total parts required.

For example: For 2 guns added, determine the parts required for the first gun, then assume the first gun has been added and determine the parts required for the second gun.

Requirements to Add One Gun

Existing console has odd number of guns. Add:

- Gun receptacle harness 1031501.

Existing console has 2, 6, 10, or 14 guns. Add:

- Gun card 1023877
- Gun receptacle harness 1031501
- iFlow module 1036657
- 10 mm tubing 900740 (6 ft)
- iFlow module screws 1034033 (2)
- iFlow module washers (983128 (2)
- iFlow module short jumper harness 1027327

Existing console has 4, 8, or 12 guns. Add:

- Regulator 1033878
- Regulator screws 982802 (4)
- Tube connector 972240
- Tube fitting 1034000
- Tube plug 148256
- 10 mm tubing 900740 (6 ft)
- 12 mm tubing 900613 (4 ft)
- iFlow module long jumper harness 1027328
- iFlow Air Flow Verification Kit 1039881 (Required to adjust regulated pressure to iFlow modules, see kit instructions for procedure.)

Procedure:

NOTE: Steps 4–11 cover installing additional regulators, iFlow modules and gun control cards. If your console has an odd number of guns you can skip these steps.

1. If adding guns requires adding new iFlow modules to the console, shut off the air supply to the console and trigger one of the guns to bleed the air pressure from the console.
2. Shut down the powder coating system. Disconnect and lock out power to the system and the iControl consoles.
3. Install the new spray guns in the booth and powder pumps on the feed hoppers or feed center. Install powder feed hose between the pumps and the guns.
4. Install the new iFlow module(s) on the rear wall with the fasteners provided. Make sure the module gasket seals against the wall.

NOTE: Modules must be installed from top to bottom and left to right.

5. Connect the new modules together with new CAN network harnesses. Refer to the *iControl Wiring and Pneumatic Diagrams* for harness requirements and connections.
6. Disconnect the network termination harness from the last old module and connect it to the last new module.
7. If installing a new regulator, install it on the next available mounting bracket from the top on the right inside wall.
8. Use 12-mm tubing to connect the regulator to an unused fitting on the air supply manifold, mounted on the rear wall near the bottom of the console.
9. Connect the iFlow modules to the regulator with 10-mm tubing.
10. Set the iFlow module network addresses as described on page 3-3.
11. Install the new gun control cards in the card cage, starting with the first open slot. Cards are installed from left to right.
12. Install the gun control harness receptacles in the rear panel, starting with the first unused knockout in the row of existing gun control harness receptacles. Plug the harnesses into the gun control card receptacles. Use the existing harness installations as a guide.
13. Connect the spray gun cables to the new harness receptacles as described on page 3-19. If you are using Versa-Spray or Tribomatic guns you must install an adapter cable between the receptacles and the gun cables. Refer to *Parts* for adapter cable part numbers.
14. Connect 8-mm blue and black air tubing from the flow module flow-rate and atomizing air fittings to the new powder pumps as described on page 3-20.
15. If used, connect clear 4-mm air tubing from the flow module gun air fittings to the new spray guns as described on page 3-20.
16. If you installed a new regulator, you must calibrate it for the correct pressure output. Use an iFlow air flow verification kit and follow the instructions in the kit instruction sheet. Refer to *Miscellaneous Kits* in *Parts* for the kit part number.

    NOTE: If your instruction sheet does not contain the calibration instructions you can download a new version of the sheet (1039518B or above) from http://emanuals.nordson.com/finishing, Powder-US>Booths and Systems>Booth and Trigger Controls, or contact the Nordson Finishing Customer Support Center or your local Nordson representative for instructions.

17. Turn on the console and configure the iControl program to add the new guns to the system. Refer to *Gun Configuration* in the *iControl Operator Interface* manual.
18. Set pickoff points for the new guns as described in the *Configuration* section of the *iControl Operator Interface* manual.
19. Set up presets for the new guns as described in the *Preset Setup* section of the *iControl Operator Interface* manual.

Adding a Slave Console to an Existing System

Adding a slave console increases the system capacity to 32 guns.

1. Connect the slave console power cable and ground cable as described on page 3-5.
2. Connect the slave console to the master console with the provided network cable. Connect the network cable from the CAN OUT terminal block on the master console backplane to the CAN AUX terminal block on the slave console backplane. Route the cable through dust-tight strain reliefs. Refer to page 3-1.
3. Set the slave console network address to console 2 as described on page 3-2.
4. Set the slave console iFlow module network addresses as described on page 3-3.
5. Connect the compressed air supply to the slave console as described on page 3-20.
6. Connect the spray gun cables and the flow-rate, atomizing, and gun air tubing to the slave console as described on page 3-19.
7. Turn on the console and configure the iControl program to add the new guns to the system. Refer to *Gun Configuration* in the *iControl Operator Interface* manual.
8. Set pickoff points for the new guns as described in the *Configuration* section of the *iControl Operator Interface* manual.
9. Set up presets for the new guns as described in the *Preset Setup* section of the *iControl Operator Interface* manual.

Installing Optional Nozzle Purge Kits

Nozzle purge kits are used only with Versa-Spray guns equipped with optional purge adapters. Nozzle purge uses high-pressure compressed air, typically at line pressure, to purge the spray gun nozzles.

The nozzle purge kits are field-installed in the iControl consoles, pneumatically connected to the console air manifold and spray guns, and electrically connected to the P5 receptacle on the backplane.

Installation instructions are shipped with the nozzle purge kits.

Section 4
Troubleshooting

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

CAUTION: Do not turn off console power without first performing a program shutdown. Doing so could corrupt the iControl program and operating system on the program card. Refer to *Program Shutdown* in the *Configuration* section of the *iControl Operator Interface* manual for the shutdown procedure.

NOTE: If the troubleshooting procedures in this section do not solve your problem, contact the Nordson Finishing Customer Support Center at (800) 433−9319 or your local Nordson representative.

Error Codes and Alarm Messages

Table 4-1 Error Codes and Messages

Code	Message Text	Description	Refer to Page
NA = Not currently applicable * – Code may differ on early software releases			
10x	**CAN and Node State**		
101	CAN bus fault detected	N/A	4-7
102	CAN receive buffer overflow	Host CAN interface receive too much data and could not process it quickly enough	4-7
103	Message timeout	Remote CAN device did not respond to a direct response in the allotted time.	4-7
104	Went offline	Remote CAN device is no longer online	4-7
105	Returned to online	Remote CAN device returned to service	4-7
106	Communication error	Host CAN interface detected a communication error	
107	BUS−OFF	255 bad CAN messages received	
108	Warning Limit exceeded	127 bad CAN messages received	
109	Bit error	Dominant bit not detected in 5 data bits	
110	Form error	Fixed format data field contains illegal bits	
111	Stuffing error	Recessive bit not detected in 5 data bits	

Continued...

Code	Message Text	Description	Refer to Page
112	Other error	Other errors not listed as Bit, Stuff, or Form	
113	CAN Transmit Buffer overflow	Host CAN interface did not transmit data quickly enough	
20x	**Application**		
201	Conveyor input not detected	Not implemented, future release	
202	Encoder not detected	Not implemented, future release	
203	Zone photoeye stuck on	Not implemented, future release	
204	Flag photoeye stuck on	Not implemented, future release	
205	Application setup	Not implemented, future release	
206	System in lockout	Not implemented, future release	
30x	**Electrostatic Controller (Gun Card)**		
301	Micro−Amp fault detected	Microamp value out of range.	4-8
302	Foldback fault detected	Current foldback detected.	4-8
303	Feedback fault detected	Microamp feedback detected.	4-8
304	Open circuit detected	No multiplier load detected.	4-8
305	Short circuit detected	Multiplier drive circuit shorted.	4-8
306	Internal hardware fault detected	Internal DSP fault.	4-9
307	Tribo	Tribomatic gun current feedback low.	4-9
308	Gun not detected	Gun not connected to system.	4-9
40x	**iFlow Controller**		
401	Flow valve not detected or bad	The solenoid resistance was not detected or incorrect when the device was not triggered.	4-13
402	Atomize valve not detected or bad	The solenoid resistance was not detected or incorrect when the device was not triggered.	4-13
403	Auxiliary solenoid not detected or bad	The solenoid resistance was not detected or incorrect when the device was not triggered.	4-13
404	Flow air flow low	Air flow less than commanded value.	4-13
405	Atomize air flow low	Air flow less than commanded value.	4-13
406	Flow air flow hi	Air flow more than commanded value.	4-14
407	Atomize air flow hi	Air flow more than commanded value.	4-14

Continued...

Code	Message Text	Description	Refer to Page
5xx	**Remote Device Node**		
Electrostatic Node (Gun Card)			
531	System Heartbeat lost	Remove device lost heartbeat message.	4-9
532	5/24 Volt power	Remove device power detection failure.	4-9
533	Error writing to internal EEPROM	Error saving data to remote device onboard EEPROM.	4-9
534	Error reading from internal EEPROM	Error reading data from remote device onboard EEPROM.	4-9
535	Node address changed from last powerup	The saved address does not match the current address for the remote device. Sending a reset command will clear this state.	4-9
536	Internal database version changed – resetting to defaults	An update to the database was detected and the current data is no longer valid.	4-9
537	Preset out of range	The preset sent to the remote device was out of range.	4-9
538	Trigger ON message received – controller in lockout	Remote device was commanded to trigger while in lockout.	4-9
iFlow Node			
541	System Heartbeat lost	Remote device lost heartbeat message.	4-14
542	5/24 Volt power	Remote device power detection failure.	4-14
543	Error writing to internal EEPROM	Error saving data to remote device onboard EEPROM.	4-14
544	Error reading from internal EEPROM	Error reading data from remote device onboard EEPROM.	4-14
545	Node address changed from last powerup	The saved address does not match the current address for the remote device. Sending a reset command will clear this state.	4-14
546	Internal database version changed – resetting to defaults	An update to the database was detected and the current data is no longer valid.	4-14
547	Preset out of range	The preset sent to the remote device was out of range.	4-14
548	Trigger ON message received – controller in lockout	Remote device was commanded to trigger while in lockout.	4-14

Continued...

Code	Message Text	Description	Refer to Page
80x	**User Interface**		
801	Backup operation failure*	Not implemented, future release	
802	Database compare failure*	Not implemented, future release	
803	Copy program failed to start*	Not implemented, future release	
804	Compare program failed to start*	Not implemented, future release	
805	Gun trigger error*	Not implemented, future release	
806	Flow/pump trigger error*	Not implemented, future release	
90x	**Ethernet Networking**		
901	I/O error	Ethernet I/O communication failure.	4-15
902	POrt or socket open error	The Ethernet connection failed to open for service.	4-15
903	Serial port already open	The Ethernet connection is already open and received an open command.	4-15
904	TCP/IP connection error	Unable to connect to remote device.	4-15
905	TCP/IP connection was closed by remote peer	Remote device closed the I/O connection.	4-15
906	Socket library error	The socket library returned error status.	4-15
907	TCP Port already bound	Requested TCP port is in use by another application.	4-15
908	Listen failed	The local system cannot detect activity on the Ethernet network.	4-15
909	File descriptors exceeded	Too many connections are open.	4-15
910	No permission to access serial or TCP port	The program requesting the Ethernet resource does not have permission to do so.	4-15
911	TCP Port not available	The requested port is busy or otherwise not available.	4-15
917	Checksum error	Data packets were received with errors.	4-15
918	Invalid frame error	Data packets were received with errors.	4-15
919	Invalid reply error	Data packets were received with errors.	4-15
920	Reply time-out	A reply to a request was not received in time.	4-15
921	Modbus exception response	An illegal Modbus command was detected.	4-15
925	Illegal Function exception response	An illegal function call was detected.	4-15
926	Illegal Data Address exception response	An illegal address was detected.	4-15
927	Illegal Data Value exception response	An illegal data value was detected.	4-15
928	Slave Device Failure exception response	The slave device returned an exception.	4-15

Continued...

Code	Message Text	Description	Refer to Page
100x, 110x	**Positioner**		
1001	E-Stop OPEN	The E-Stop circuit is open.	4-18
1002	Encoder failure	The encoder is not responding when motion is commanded or is responding with defective signals.	4-18
1003	Motor Protector	The motor protector is open.	4-19
1004	Motion Controller	The motion controller indicates a failure.	4-19
1005	Forward Contactor	The forward contactor did not engage.	4-19
1006	Reverse Contactor	The reverse contactor did not engage.	4-19
1007	Forward End of Travel Limit	The machine is at the forward end of travel limit.	4-20
1008	Reverse End of Travel Limit	The machine is at the reverse end of travel limit.	4-20
1112	Positioner not in ready state for Color Change	The positioner has not reached the proper location for color change.	4-20
200x, 210x	**Reciprocator**		
2001	E-Stop Open	The E-Stop circuit is open.	4-25
2002	Encoder failure	The encoder is not responding when motion is commanded or is responding with defective signals.	4-25
2003	Motor Protector	The motor protector is open.	4-26
2004	Motion Controller	The motion controller indicates a failure.	4-26
2005	Forward Contactor	The forward contactor did not engage.	4-26
2006	Reverse Contactor	The reverse contactor did not engage.	4-26
2007	Forward End of Travel Limit	The machine is at the forward end of travel limit.	4-27
2008	Reverse End of Travel Limit	The machine is at the reverse end of travel limit.	4-27
2101	Part size less than minimum	The part detected is too small. The reciprocator will attempt to stroke at the minimum length.	4-27
2102	Lead gun not defined – using gun 1	The lead gun on the reciprocator is not defined.	4-27
2103	Trail gun not defined – using gun 1	The trailing gun on the reciprocator is not defined.	4-27
2104	Trail gun less than lead – trail = lead	The trailing gun number is less than the lead gun number.	4-27
2105	Pattern width not set – using 12 inches (305 mm)	The pattern width has not been set using default.	4-27
2106	Vertical scanner not configured – recip mode 1 invalid	A vertical scanner is required for variable stroke operation.	4-27
2107	Speed calculated less than minimum	The speed of the reciprocator is less than the minimum value allowed.	4-28

Continued...

Code	Message Text	Description	Refer to Page
2108	Speed calculated greater than maximum	The speed of the reciprocator is greater than the maximum value allowed.	4-28
2113	Reciprocator not in ready state for Color Change	The reciprocator is not in the proper position for color change.	4-28
300x	**Watchdog**		
3100	Positioner Watchdog fault	The remote Ethernet device did not respond with a watchdog signal in 1 second.	4-20
3200	Reciprocator Watchdog fault	The remote Ethernet device did not respond with a watchdog signal in 1 second.	4-28
410x	**Color Change**		
4109	Clean cycle aborted arch clean operation – waiting on park release	Clean cycle detected an abort – waiting for user to press park to release.	4-20
4110	Clean cycle aborted by user action – park release detected	Clean cycle aborted by user – part release was detected.	4-20
4111	Clean cycle aborted detected machine lockout/watchdog	A machine malfunction aborted the cleaning operation.	4-20

CAN Network Errors

Table 4-2 CAN Network Messages

Error Code	Message	Cause/Correction
101	CAN bus fault detected	Hardware error. Check the CAN cable for shorts. If the cable is good, replace the PC104 CAN card.
102	CAN receive buffer overflow	Host CAN interface received too much data and could not process it quickly enough. Reboot the system.
103	Message timeout	Remote CAN device did not respond to a direct request in the allotted time. Check the gun card or iFlow card.
104	Went offline	Normal operational message. The user will see this message if the booth exhaust fan is shut off, which removes power from gun cards, or if the gun card is disconnected, or if the iFlow module is disconnected from the CAN network.
105	Returned to online	Normal operational message. No action required.
107	Communications errors	These error messages indicate that communications on the iControl CAN bus may be having problems. Troubleshooting should include verification of all CAN cable connections and grounding, and gun cable connections and continuity. CAN errors can also be caused by individual gun cards or the iControl PC to PC104 card interface. These errors do not indicate a specific device failure as all devices are in parallel on the CAN bus.
108		
109		
110		
111		
112		
113		

Gun Card Troubleshooting

Refer to Figure 4-1 and Tables 4-3 and 4-4. Use the fault codes on the Gun Control screens, the fault messages on the Alarm screen, and the LEDs on the gun control cards to diagnose problems with the gun control cards.

Gun Card Error Codes and Fault Codes

These faults, except for E16, will activate the alarm relay.

Table 4-3 Gun Card Error and Fault Codes

Error Code	Message	Fault Code	Meaning/Correction
301	Micro−Amp fault detected	–	Microamp value out of range.
302	Foldback fault detected	E15	Current foldback detected. Unplug the cable from the gun and trigger the gun. • If the fault changes to E7, check the resistance of the multiplier as described in the gun manual. • If the fault code stays E15, check the continuity of the cable as described in the gun manual.
303	Feedback fault detected	E3	Microamp feedback not detected. Check the gun current with no parts in front of the gun. If the current is 105 μA, check for a short circuit of the current feedback wires in the gun cable: Unplug the cable from the gun and trigger the gun. • If the fault stays E3, replace the cable. • If the fault changes to E7, check the resistance of the multiplier as described in the gun manual.
304	Open circuit detected	E7	Gun cable or multiplier open circuit. If the current display is 1 μA or less, check the multiplier cable and electrode assembly for loose connections. • If the connections are secure, check the multiplier with an ohmmeter as described in the gun manual. • If the multiplier reading is acceptable, check for a defective cable as described in the gun manual.
305	Short circuit detected	E8	Gun cable or multiplier short circuit. Unplug the cable from the gun and trigger the gun. • If the fault changes to E7, check the resistance of the multiplier as described in the gun manual. • If the fault code stays E8, check the continuity of the cable as described in the gun manual.

Continued...

Error Code	Message	Fault Code	Meaning/Correction
306	Internal hardware failure	E11	Internal DSP fault in gun control card. 1. Turn off the power to the system. 2. Unplug the cable from the back of the gun. 3. Turn on the power to the system. If the fault code changes to E7 (open circuit), the card is working correctly. Check the gun multiplier. If the fault code remains at E11, replace the gun control card.
307	Tribo	E17	Tribomatic μA feedback below setpoint. Check the powder flow for poor charging. Check for moisture in the compressed air supply.
308	Gun not detected	E16	Gun not connected to system. Check the gun cable connections and make sure the gun card is seated securely into the backplane. This is a normal indication if power to cards is removed, such as when the booth exhaust fan is shut off.
531	System heartbeat lost	–	Check circuit board connections.
532	5/24 volt power	–	Check circuit board connections.
533	Error writing to internal EEPROM	–	Hardware error. Replace card.
534	Error reading to internal EEPROM	–	Hardware error. Replace card.
535	Node address changed from last power up	–	Saved address does not match current address. Address switches were changed. Informational message only.
536	Internal database version changed – resetting to defaults	–	An update to the database was detected and the current data is no longer valid. Informational message only, operation should not be affected.
537	Preset out of range	–	The preset sent to the remote device was out of range. Check preset settings and reset as required.
538	Trigger ON message received – controller in lockout	–	The card was commanded to trigger but the system is locked out. Trigger ON commands will be ignored until the system is returned to the Run state.

Gun Card LEDs

See Figure 4-1. Use the card LEDs to help diagnose problems.

Table 4-4 Gun Card LEDs

LED	Color	Function	Correction
Fault	Red	Lights when a fault is detected (communication, gun cable, RAM, or hardware).	If two guns are not connected to the card this LED will light. If you have an odd number of guns in the system, unplug the unused harness and install the jumper plug shipped with the console. (Refer to *Odd Number of Guns* below or the *Installation* section.) Make sure the card is seated in the backplane. Open the Alarm screen and clear all faults. Replace the card if the malfunction cannot be corrected.
Status	Green	Flashing (heartbeat) when communicating properly with system.	If the status LED is not flashing, make sure the card is seated in the backplane. Turn console power off and on. Replace the card if the other gun control cards have heartbeats.
Foldback B (even-numbered gun	Yellow	Lights if over-current protection circuit triggered due to high current draw from gun drive circuit.	Refer to the corrections for Fault Code E15 in Table 4-3.
Foldback A (odd-numbered gun)			
Power	Green	Light when power (5 volts) is applied to the board).	If the card has no power, make sure it is properly seated in the backplane and the locking tab is working correctly. Replace the card if the other gun control cards have power.

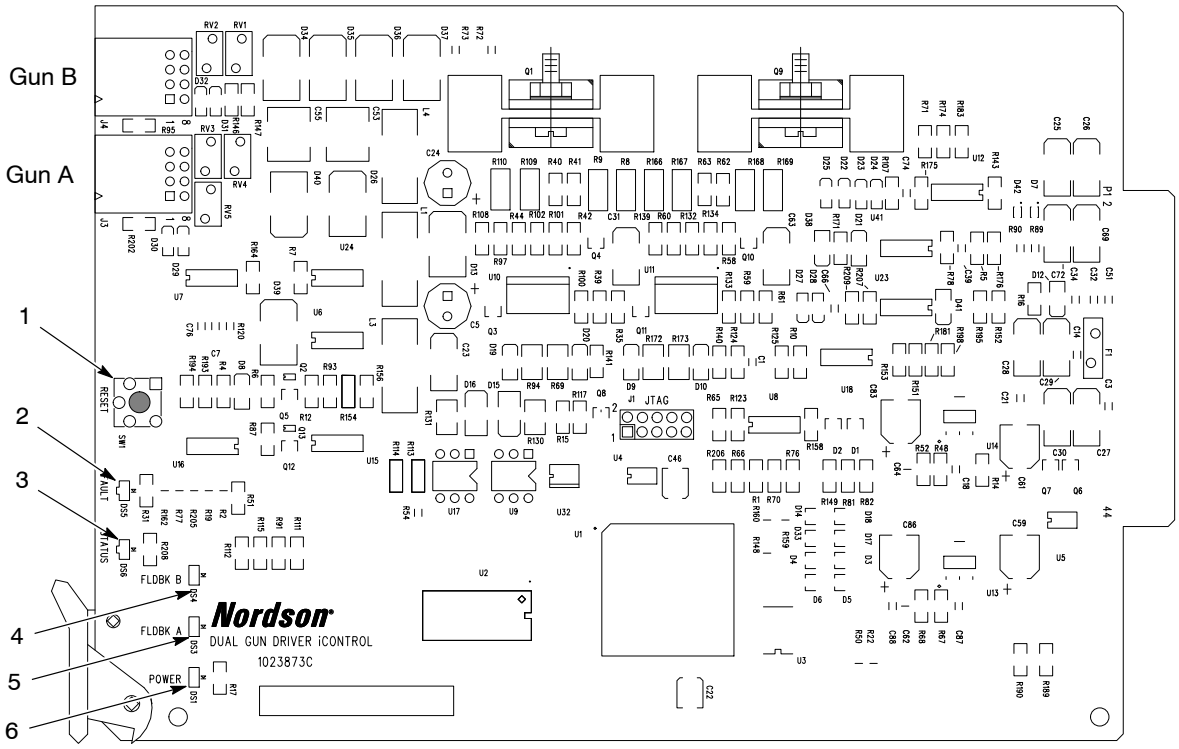


Figure 4-1 Gun Control Card LEDs and Switches

1. Reset switch (reboots the on-board processor)
2. Fault LED (red)
3. Status LED (green)
4. Foldback B LED (yellow)
5. Foldback A LED (yellow)
6. Power LED (green)

iFlow Module Troubleshooting

NOTE: iFlow module output can be checked with the iFlow Air Flow Verification Kit. Refer to *Miscellaneous Kits* in *Parts* for the kit part number. Instructions are supplied with the kit.

CAUTION: Handle the verfication kit orifice carefully. Any damage to the orifice will result inaccurate results.

Re-Zero Procedure

Perform this procedure if an iControl gun control screen indicates air flow when the spray gun is not triggered on, or if a Flow Air or Atomizing Air Flow High Fault (F6 or F7) appears on the Gun Control panel and the Fault screen.

Before performing a re-zero procedure:

- Make sure the air pressure being supplied to the iControl console is higher than the minimum 5.86 bar (85 psi).
- If the regulator supplying the module being tested is new, make sure it has been calibrated for the correct pressure output. Use an iFlow air flow verification kit and follow the instructions in the kit instruction sheet. Refer to *Miscellaneous Kits* in *Parts* for the kit part number.

  NOTE: The Air Flow Verification Kit instruction sheet can be downloaded from http://emanuals.nordson.com/finishing, Powder-US>iControl System.

- Make sure no air is leaking through the module output fittings or from around the solenoid valves or proportional valves. Re-zeroing modules with leaks will result in additional errors.

See Figure 4-2.

1. Disconnect the atomizing and flow air tubing from all four of the 8-mm output ports and plug the ports with tube plugs.
2. Note the setting of address switch SW3, then set it to zero.
3. Press pushbutton switch SW1 to reset the module. The red LED should blink on and off.
4. Press and hold pushbutton switch SW2 for about 2 seconds, until the red LED stops blinking. This re-zeros the module. After a short time the red LED should start blinking again.
5. Move address switch SW3 back to its original position.
6. Press pushbutton switch SW1 again. The red LED should shut off.
7. Remove the tube plugs from the output ports.
8. Check the Gun Control panel. With the spray gun off, the display should show no air flow.

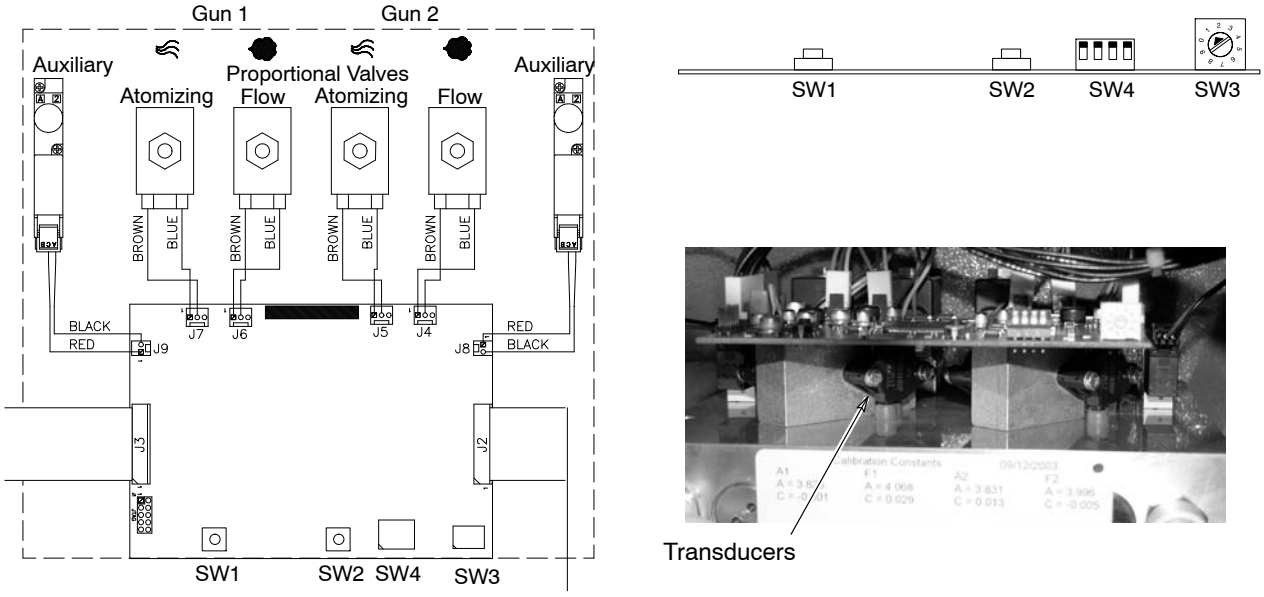


Figure 4-2 iFlow Module Switches, Flow and Atomizing Proportional Valves, and Transducers

iFlow Module Error Codes and Fault Codes

Faults F1 – F7 will activate the alarm relay.

Table 4-5 iFlow Module Fault Codes

Error Code	Error Message	Fault Code	Correction
401	Flow valve not detected or bad	F1	See Figure 4-2. When the solenoid is not energized, the resistance of the solenoid is checked by the system. These faults are generated if no resistance is detected, or the correct resistance is not detected. Check the proportional valve wiring connections. Check the solenoid operation. Replace the valve if the solenoid is bad.
402	Atomize valve not detected or bad	F2	
403	Auxiliary solenoid valve not detected or bad	F3	
404	Flow airflow low	F4	Air flow is less than commanded value. Air flow setting may be too high for the system to achieve. Do not set above 3.5 SCFM. Check the tubing from the iFlow module to the powder pump for kinks or blockage. Make sure the check valves are not blocked. Disconnect the air tubing at the pump. If the fault goes away, clean or replace the pump venturi nozzle or throat.
405	Atomize airflow low	F5	Disconnect the air tubing from the iControl console. If the fault goes away, then the air tubing is too long or the tubing diameter is too large. If more than one module reports the same fault, check the console air supply pressure. The pressure must be above 85 psi. Check the tubing supplying air to the iFlow module for blockage.

Continued...

Error Code	Error Message	Fault Code	Correction
406	Flow airflow high	F6	Air flow more than the commanded value. If the spray gun is triggered off, disconnect the air tubing from the output fitting and plug the fitting. Reset the fault. If the fault does not reoccur then the proportional valve is stuck open. Refer to *Section 5, Repair*, for cleaning instructions. If the spray gun is triggered on, disconnect the air tubing from the output fitting and set the flow to zero. If air is still flowing from the fitting then plug the fitting and then reset the fault. If the fault does not reoccur then the proportional valve is stuck open. Refer to *Section 5, Repair*, for cleaning instructions. If the fault reoccurs and the screen is showing air flow, then check for leaks around the proportional valves or transducers. Re-zero the airflow module as described on page 4-12.
407	Atomize airflow high	F7	
541	System heartbeat lost	–	Check circuit board connections.
542	5/24 volt power	–	Check circuit board connections.
543	Error writing to internal EEPROM	–	Hardware error. Replace card.
544	Error reading to internal EEPROM	–	Hardware error. Replace card.
545	Node address changed from last power up	–	Saved address does not match current address. Address switches were changed. Informational message only.
546	Internal database version changed – resetting to defaults	–	An update to the database was detected and the current data is no longer valid. Informational message only, operation should not be affected.
547	Preset out of range	–	The preset sent to the remote device was out of range. Check preset settings and reset as required.
548	Trigger ON message received – controller in lockout	–	The card was commanded to trigger but the system is locked out. Trigger ON commands will be ignored until the system is returned to the Run state.

Remote I/O (Ethernet) Network Troubleshooting

All Remote I/O Network faults will activate the alarm relay. Use the fault messages on the Alarm screen along with this table to diagnose and correct Ethernet network problems. You can also use the Network Status and Node Configuration screens, and the Remote Node Troubleshooting tables on page 4-33 to diagnose problems with the remote nodes.

Table 4-6 Ethernet Network Troubleshooting

Error Code	Message/Condition	Correction
901	I/O error	Check Ethernet wiring. Remote node could be disconnected from network or turned off.
902	Port or socket open error	Programming error. Contact Nordson technical support.
903	Serial port already open	Programming error. Contact Nordson technical support.
904	TCP/IP connection error	Check Ethernet wiring. Remote node could be disconnected from network or turned off.
905	TCP/IP Connection closed by remote peer fault (any remote node fault)	Ethernet network communication with the remote node has been lost. This fault may be a normal response to removing electrical power from the remote node. If the remote node is an in/out positioner or reciprocator and communication is lost while operating in Auto mode, the machine will move to the Park position. Check the Network Node Status screen. If communication is lost the node icon should turn red. If no nodes are red, check the Network Node Configuration screen to find the device associated with the faulted node IP address. **If multiple node faults are displayed:** Check the electrical power supply to all faulted nodes. Check the Ethernet switch in the network interface box for electrical power and proper operation. The switch power LED should be lit and the network connection LEDs should be flashing. Replace the switch if necessary. Check the network cable and connections between the Ethernet switch and the iControl console. Refer to *Testing Ethernet Cables* in this section. Check the Ethernet card on the iControl PC for proper operation. The ACT LED indicates network traffic when lit. The LNK LED to the right of the RJ-45 connector indicates network status (green: 10 Mbs, amber: 100 Mbs, off: no connection). Replace the card if necessary, using only an identical or Nordson supplied replacement. **If a single node fault is displayed:** Check the electrical power to the remote node controller or coupler. Check network cables and connections between the remote node and the Ethernet switch (in the network interface box). Refer to *Testing Ethernet Cables* in this section.
906	Socket library error	Programming error. Contact Nordson technical support.
907	TCP port already bound	Programming error. Contact Nordson technical support.

Continued...

Error Code	Message/Condition	Correction
908	Listen failed	Programming error. Contact Nordson technical support.
909	File descriptors exceeded	Programming error. Contact Nordson technical support.
910	No permission to access serial or TCP port	Programming error. Contact Nordson technical support.
911	TCP port not available	Programming error. Contact Nordson technical support.
917	Checksum error	Noise in network. Check for loose connections or Ethernet cables routed parallel to high voltage or VFDs.
918	Invalid frame error	Noise in network. Check for loose connections or Ethernet cables routed parallel to high voltage or VFDs.
919	Invalid reply error	Noise in network. Check for loose connections or Ethernet cables routed parallel to high voltage or VFDs.
920	Reply time-out	Noise in network. Check for loose connections or Ethernet cables routed parallel to high voltage or VFDs.
921	Modbus exception response	Programming error or remote hardware error. Check Fieldbus controller functions. Refer to *Remote Node Troubleshooting* in this section.
925	Illegal Function exception response	Programming error or remote hardware error. Check Fieldbus controller functions. Refer to *Remote Node Troubleshooting* in this section.
926	Illegal Data Address exception response	Programming error or remote hardware error. Check Fieldbus controller functions. Refer to *Remote Node Troubleshooting* in this section.
927	Illegal Data Value exception response	Programming error or remote hardware error. Check Fieldbus controller functions. Refer to *Remote Node Troubleshooting* in this section.
928	Slave Device Failure exception response	Programming error or remote hardware error. Check Fieldbus controller functions. Refer to *Remote Node Troubleshooting* in this section.
–	Watchdog Fault (any remote node controller fault)	Control program in remote node controller is not running, or controller has no program installed. **NOTE:** This fault may be a normal response to removing electrical power from the remote node. Check the remote node controller mode selection switch. The switch should be in the run (up) position. Replace the remote node controller. The replacement must be pre-programmed or a program must be downloaded and installed in the field. Contact Nordson Finishing Customer Support for details.
–	Operation was successful	Normal operation. No action required.
–	Illegal argument error	Programming error. Contact Nordson technical support.
–	Illegal state error	Programming error. Contact Nordson technical support.
–	Evaluation expired	Programming error. Contact Nordson technical support.

Continued...

Error Code	Message/Condition	Correction
–	I/O error class	Programming error. Contact Nordson technical support.
	Fieldbus protocol error class	Programming error. Contact Nordson technical support.

In/Out Positioner Troubleshooting

Use the fault messages on the Alarm screen with this table to diagnose and correct in/out positioner or reciprocator problems. Refer to *Remote I/O Network Troubleshooting* on page 4-15 if the fault messages indicate a communications problem (Watchdog fault or TCP/IP communications fault).

Each fault message displayed on the iControl screen is accompanied by a device and number identifier. The identifier indicates the faulted machine (for example, IN/OUT Positioner #1, Reciprocator #2). When the fault condition is corrected or cleared, the fault message will indicate a returned-to-normal status.

For all in/out positioner faults, the alarm relay contacts open to signal an alarm condition. You can use the alarm relay to activate an external alarm. Refer to *Console Power Cable Connections* in the *Installation* section for more information.

In/Out Positioner Error Code Troubleshooting

Table 4-7 In/Out Positioner Error Code Troubleshooting

Error Code	Message	Correction
1001	E-Stop Open	In/out positioner or reciprocator E-Stop button pressed. Determine why E-Stop button was pressed and correct if necessary. Reset E-stop button when clear to do so.
1002	Encoder Failure Fault	In/out positioner or reciprocator not moving. Mechanical, motor, or motor controller failure. Change in/out positioner or reciprocator operating mode to Manual and check for proper forward and reverse (up and down) motion. If only one direction of movement, check motor control circuits. If no motion, check the following: Check the positioner carriage to make sure it moves properly. Make sure that • the anti-tip device is adjusted properly • a carriage wheel bearing has not failed • no obstructions are preventing motion. Check the pulleys, belts, or other mechanical link connecting the gear reducer to the gun moving carriage. If the gear reducer is not rotating but the motor is, replace the reducer. If the drive motor is not rotating, check the motor circuit protection, motor wiring, motor controller, and motor control circuits. This fault must be reset from the iControl alarm screen.

Continued...

Error Code	Message	Correction
1003	Motor Protector	Circuit protector limiting current to the in/out positioner or reciprocator motor has failed. Check mechanical components of in/out positioner for proper operation. Lubricate, repair, or replace components as needed. Check motor electrical circuit between protector and motor. Repair or replace wiring, terminals, or motor control components as needed. Reset circuit protector after corrections have been made.
1004	Motion Controller Fault	Motor speed controller “ready for operation” feedback signal has failed. Check the status display on the motor speed controller for fault indications. Status can only be displayed while power is applied. Cycling power to the controller will generally reset the fault condition. Determine the probable cause based on the controller fault status information. Correct the problem causing the fault or replace the controller if necessary.
1005	Forward Contactor	Auxiliary contact on the motor forward contactor did not close when the in/out positioner was commanded to move forward. Check forward contactor for proper operation. Repair or replace contactor as needed. Check control circuit and devices that energize the contactor for proper operation. Repair or replace components as needed. This fault must be reset from the iControl alarm screen.
1006	Reverse Contactor Fault	Auxiliary contact on the motor reverse contactor did not close when the in/out positioner was commanded to move in reverse. Check reverse contactor for proper operation. Repair or replace contactor as needed. Check control circuit and devices that energize the contactor for proper operation. Repair or replace components as needed. This fault must be reset from the iControl alarm screen.
		The in/out positioner or reciprocator position feedback encoder is not putting out pulses. **NOTE:** If an encoder fails, an in/out positioner will move to the reverse limit position. A reciprocator will stop. Check all encoder mechanical and electrical connections. Make sure the encoder is powered. Check pulse output from the encoder. Replace encoder if necessary. This fault must be reset from the iControl alarm screen.

Continued...

Error Code	Message	Correction
1007 1008	Forward or Reverse End-of-Travel Limit fault	In/out positioner color change cycle takes too long (Automatic color change system). During an automatic color change cycle the positioner is commanded to make both forward and reverse moves. This fault occurs if the positioner did not reach the limit in a set amount of time (20 seconds for forward and 75 seconds for reverse). For a 1007 Forward fault: Check for an obstruction to forward motion. Check the operation of the forward limit switch. For a 1008 Reverse fault: Check for an obstruction to reverse motion. Check the operation of the reverse limit switch. If there is no obstruction and the reverse limit switch is good, increase the motion speed slightly.
1112	Positioner not in ready state for color change Positioner code: 1112	In/out positioner not in Manual or Auto mode. Color change cycle cannot start unless in/out positioner is in Manual or Auto mode. Set in/out positioner mode to Manual or Auto.
3100	Positioner Watchdog fault	The positioner controller did not respond with a watchdog signal in 1 second. Check the Ethernet cable connections and the positioner controller.
4109	Clean cycle aborted Arch clean operation waiting on Park release (Euro color change only)	During a SpeedKing booth cleaning cycle, an in/out positioner has moved off its reverse limit switch or the limit switch has failed. All in/out positioner reverse limit switches must be engaged for iControl system to send “OK for Cleaning Arch” signal. Check in/out positioners for position, check limit switches and replace failed switch.
4110	Clean cycle aborted by user action – Park release detected (Euro color change only)	Park button touched causing color change cycle to abort. Touching the Park button to abort the color change cycle is a normal function. If the button was mistakenly touched before the cycle ended, the cycle must be restarted from the beginning.
4111	Clean cycle aborted detected machine lockout/watchdog fault (Euro color change only)	Communication with in/out positioner or reciprocator controller lost during color change cycle. Check the iControl alarm log for Watchdog or TCP/IP faults. Refer to *Remote I/O Network Troubleshooting* on page 4-15.

Other In/Out Positioner Troubleshooting

Table 4-8 Other In/Out Positioner Troubleshooting

Problem	Cause	Correction
No movement from in/out positioner in response to move command	A fault has occurred preventing operation.	Check the iControl alarm log. Identify the fault and review the fault troubleshooting information in this table.
	Controller configuration jumpers not in place.	Refer to in/out positioner or in/out positioner/reciprocator control panel drawings in Section 7 for function identification and jumper placement instructions.
	Configuration lockout applied to in/out positioner.	Check the In/Out Positioner control screen for the lockout indicator. Lockout is applied from the Configuration screens.
	iControl lockout applied to guns, in/out positioners, and reciprocators.	This is a normal condition unless a failure has occurred. Refer to *Photoeye, Encoder, and Interlock Troubleshooting* in this section.
	Remote disable applied to in/out positioner controller. No status display on iControl screens.	If Nordson USA ColorMax system: Disable action is applied by a remote system control panel keyswitch. In the Disable position, the keyswitch opens the disable input circuit at the in/out positioner controller. No corrective action is required unless the keyswitch Normal position does not allow motion. Refer to your system drawings for circuit details. If not Nordson USA ColorMax system: Apply jumper to force On the remote disable input. Refer to system drawings for jumper application.
No in/out positioner response when Auto mode selected	A fault has occurred preventing Auto operation.	Check iControl alarm screen. Identify the fault and correct. Review the related faults and corrections listed in this table.
	iControl in/out positioner configuration settings have not been completed.	Refer to *Network Configuration* and *In/Out Positioner Configuration* in the iControl Operator Interface manual. Make sure all required settings have been made and are correct. Refer to the in/out positioner/reciprocator control panel drawings and make sure all connections have been made correctly.

Continued...

Problem	Cause	Correction
Auto mode is selected, homing has completed, but no auto positioning response from in/out positioner	Auto hold action has been applied to the in/out positioner.	The in/out positioner is forced to the Retract position (refer to in/out positioner configuration setting). This is a normal and temporary occurrence when the iControl system does not know the status of the parts on the conveyor between the in/out positioner scanner and the in/out positioner. This condition occurs when the iControl console is powered up or rebooted and part tracking (shift register) information is lost. Auto positioning will commence when parts identified by the in/out positioner scanners arrive at the in/out positioner. Manual positioning is allowed during this period.
	Booth interlock has opened (booth exhaust fan shut down).	The booth exhaust fan has been turned off. The in/out positioner moves to the Park position (refer to in/out positioner configuration settings) if the Auto mode is selected. The in/out positioners can be operated manually while the booth fan is off.
	In/Out Positioner scanner not responding to parts passing by on the conveyor.	Conveyor encoder not sending pulses to the iControl system. Refer to *Photoeye, Encoder, and Conveyor Interlock Troubleshooting* on page 4-32. In/Out Positioner scanners not detecting parts: Check scanner input values on the Input Status screen. Refer to the *Monitoring Operation* section of the iControl Operator Interface manual. Check for scanner remote node communication failure on the Network Node Status screen and Node Configuration screens. Refer to *Remote I/O Network Troubleshooting* in this section. Check for electrical power at the scanner controllers. Check for a voltage signal, 0–10 Vdc = length of scanner (0 = maximum), from the scanner controller to the analog input module. Refer to the In/Out Positioner Scanner Junction Box drawings in this manual. If a voltage signal is read at the analog input module, and there is no problem with the Ethernet network connections to the controller node, then replace the analog input module.
	In/Out Positioner preset set to Fixed.	Normal operating scenario. Position change will only occur when a new part appears at the in/out positioner.

Continued...

Problem	Cause	Correction
Auto mode is selected, in/out positioner stays at the reverse limit position	Refer to Problem “Auto mode is selected, homing has completed, but no auto positioning response from in/out positioner.“	
	Park/Clean and Retract position values set too high.	Set the Park/Clean and Retract position values to less than reverse limit switch position value. If the values are greater, the in/out positioner will stop at the reverse limit switch and generate a fault condition during normal operation. **NOTE:** If the in/out positioner is an analog version, then the Reverse Limit value must equal the position at the reverse limit switch.
In/Out Positioner “jumps” back to a stop after moving to a new position	In/Out Positioner Hysteresis value too small.	Open In/Out Positioner Configuration screen and increase the Hysteresis value. The hysteresis value is the allowable over- or under-shoot distance from the target position. If the in/out positioner is within this distance of the desired position when it stops, the iControl system will not move it again to the target position. If the value is not large enough, the in/out positioner will over- or under-shoot its destination and then “jump” back to it (called hunting). A typical setting is 0.5 – 0.7 inches depending on the in/out positioner speed setting.
In/Out Positioner actual travel distance does not match value shown on iControl screens	In/Out Positioner position calibration not completed, or in/out positioner forward or reverse limit switch moved since last position calibration.	In/Out Positioner calibration involves moving the in/out positioner to a stop at the forward limit switch and then within 60 seconds moving it to the reverse limit switch. This sets zero at the forward limit switch and a reverse limit reference at the reverse limit switch. Calibration is performed during in/out positioner configuration, but can be performed at any time while in Manual mode. If the physical position of either limit switch has been changed, then positioning will be incorrect. You must recalibrate the in/out positioner if you move the limit switches. **NOTE:** The first time Auto mode is selected after in/out positioner power up, the in/out positioner moves to the reverse limit switch (home) and acquires a reverse reference value. This value is used to reset the in/out positioner position for Auto operations.

Continued...

Problem	Cause	Correction
In/Out Positioner actual travel distance does not match value shown on iControl screens *(continued)*	Incorrect encoder resolution entered on in/out positioner configuration screen.	**NOTE:** Encoder resolution can only be entered or changed by a Nordson representative. Verify encoder resolution (number of pulses output for one inch of travel) and enter that value on the in/out positioner configuration screen. If the number is not know and cannot be mechanically calculated, then a trial and error method can be attempted. Perform this procedure from the in/out positioner configuration screen: 1. Manually move the in/out positioner to the forward limit (zero position). 2. Reverse the in/out positioner slightly off the limit, record the displayed position value, and apply reference marks to the in/out positioner and base. 3. Manually move the in/out positioner in reverse, almost but not all the way to the reverse limit (the greater the distance the more accurate the calculated resolution will be). 4. Use your reference marks to measure the distance moved and compare the measured distance to the displayed position value. 5. The ratio of these two values is used to calculate a new encoder resolution. If the displayed position value is greater than the measured distance, then increase the encoder resolution. If the displayed position value is less than the measure value, then decrease the resolution.
	Mechanical failure in connection of in/out positioner encoder to machine motion.	Check the mechanical components and connections linking the encoder rotation to the movement of the in/out positioner.

Reciprocator Troubleshooting

Use the fault messages on the Alarm screen with this table to diagnose and correct reciprocator problems. Refer to *Remote I/O Network Troubleshooting* on page 4-15 if the fault messages indicate a communications problem (Watchdog fault or TCP/IP communications fault).

Each fault message displayed on the iControl screen is accompanied by a device and number identifier. The identifier indicates the faulted machine (for example, IN/OUT Positioner #1, Reciprocator #2). When the fault condition is corrected or cleared, the fault message will indicate a returned-to-normal status.

For all in/out positioner faults, the alarm relay contacts open to signal an alarm condition. You can use the alarm relay to activate an external alarm. Refer to *Console Power Cable Connections* in the Installation section for more information.

Reciprocator Error Code Troubleshooting

Table 4-9 Reciprocator Error Code Troubleshooting

Error Code	Message	Correction
2001	E-Stop Open	In/out positioner or reciprocator E-Stop button pressed. Determine why E-Stop button was pressed and correct if necessary. Reset E-stop button when clear to do so.
2002	Encoder Failure Fault	In/out positioner or reciprocator not moving. Mechanical, motor, or motor controller failure. Change in/out positioner or reciprocator operating mode to Manual and check for proper forward and reverse (up and down) motion. If only one direction of movement, check motor control circuits. If no motion, check the following: Check the positioner carriage to make sure it moves properly. Make sure that • the anti-tip device is adjusted properly • a carriage wheel bearing has not failed • no obstructions are preventing motion. Check the pulleys, belts, or other mechanical link connecting the gear reducer to the gun moving carriage. If the gear reducer is not rotating but the motor is, replace the reducer. If the drive motor is not rotating, check the motor circuit protection, motor wiring, motor controller, and motor control circuits. This fault must be reset from the iControl alarm screen.

Continued...

Error Code	Message	Correction
2003	Motor Protector	Circuit protector limiting current to the in/out positioner or reciprocator motor has failed. Check mechanical components of in/out positioner for proper operation. Lubricate, repair, or replace components as needed. Check motor electrical circuit between protector and motor. Repair or replace wiring, terminals, or motor control components as needed. Reset circuit protector after corrections have been made.
2004	Motion Controller Fault	Motor speed controller “ready for operation” feedback signal has failed. Check the status display on the motor speed controller for fault indications. Status can only be displayed while power is applied. Cycling power to the controller will generally reset the fault condition. Determine the probable cause based on the controller fault status information. Correct the problem causing the fault or replace the controller if necessary.
2005	Forward Contactor	Auxiliary contact on the motor forward contactor did not close when the in/out positioner was commanded to move forward. Check forward contactor for proper operation. Repair or replace contactor as needed. Check control circuit and devices that energize the contactor for proper operation. Repair or replace components as needed. This fault must be reset from the iControl alarm screen.
2006	Reverse Contactor Fault	Auxiliary contact on the motor reverse contactor did not close when the in/out positioner was commanded to move in reverse. Check reverse contactor for proper operation. Repair or replace contactor as needed. Check control circuit and devices that energize the contactor for proper operation. Repair or replace components as needed. This fault must be reset from the iControl alarm screen.
		The in/out positioner or reciprocator position feedback encoder is not putting out pulses. **NOTE:** If an encoder fails, an in/out positioner will move to the reverse limit position. A reciprocator will stop. Check all encoder mechanical and electrical connections. Make sure the encoder is powered. Check pulse output from the encoder. Replace encoder if necessary. This fault must be reset from the iControl alarm screen.

Continued...

Error Code	Message	Correction
2007 2008	Forward or Reverse End-of-Travel Limit fault	Auto mode is selected and the reciprocator has engaged the forward (upper) or reverse (lower) end-of-travel limit sensor. Select Manual mode and move the reciprocator off the limit, then re-select Auto mode. Check the configured soft top and bottom limits. Make sure they do not allow travel to the limit sensors. Adjust the configured reciprocator Turn-Around Offset (Nordson CSR only) to ensure that the limit sensors are not engaged. Check reciprocator encoder wiring. If signals switched position tracking will be reversed. Typically only seen on initial startup or if encoder is replaced. Reciprocator encoder has failed. Refer to Encoder Failure fault.
		Gun carriage has fallen to the reverse limit as a result of a mechanical failure. Check belts, pulleys, bearings, etc. for proper operation. Refer to reciprocator manual. This fault must be reset from the iControl Alarm screen.
		Gun carriage has slowly drifted or was moved to the top or bottom of stroke. Incorrect counterweight to neutralize the weight of the guns and gun carriage. Refer to reciprocator manual. This fault must be reset from the iControl Alarm screen.
2101	Part size less than minimum	Default or preset settings define a stroke length less than the minimum 4 in. Change default or preset settings, or if parts are small consider turning off reciprocators for batch.
2102	Lead gun not defined – using gun 1	Lead gun number not entered in reciprocator configuration. Enter number for lead gun in reciprocator configuration.
2103	Trail gun not defined – using gun 1	Trail gun number not entered in reciprocator configuration. Enter number for trail gun in reciprocator configuration.
2104	Trail gun less than lead – trail = lead	Lead and trail gun numbers not entered correctly in reciprocator configuration. Correct gun number entries in reciprocator configuration. Lead gun number must be lower than trail gun number.
2105	Pattern width not set – using 12 inches	No value for pattern width entered in reciprocator configuration. Enter value for pattern width in reciprocator configuration.
2106	Vertical scanner not configured – reciprocator mode 1 invalid	Reciprocator set for variable stroke mode, no part size data available. A part size, as seen by a vertical scanner or customer PLC, is required for variable mode. If no part size data is available, set reciprocator to a fixed mode.

Continued...

Error Code	Message	Correction
2107	Speed calculated less than minimum	Default or preset settings for variable mode resulting in speed less than minimum. Minimum speed is 15 ft/min. Change default or preset settings. Part may be too small to use variable mode, change to a fixed mode.
2108	Speed calculated greater than maximum	Default or preset settings for variable mode or fixed with conveyor synchronization resulting in speed faster than maximum. Change the default or preset settings or reduce the conveyor speed.
1112	Positioner not in ready state for color change	In/out positioner not in Manual or Auto mode. Color change cycle cannot start unless in/out positioner is in Manual or Auto mode. Set in/out positioner mode to Manual or Auto.
2113	Reciprocator not in ready state for color change	Reciprocator not in Auto mode. Color change cycle cannot start unless reciprocator is in Auto mode. Set reciprocator mode to Auto.
3200	Reciprocator Watchdog fault	The reciprocator controller did not respond with a watchdog signal in 1 second. Check the Ethernet cable connections and the reciprocator controller.

Other Reciprocator Troubleshooting

Table 4-10 Other Reciprocator Troubleshooting

Problem	Cause	Correction
No movement from reciprocator in response to move command	A fault has occurred preventing operation.	Check the iControl alarm log. Identify the fault and review the fault troubleshooting information in this table.
	Controller configuration jumpers not in place.	Refer to in/out positioner/reciprocator control panel drawings in Section 7 for function identification and jumper placement instructions.
	Configuration lockout applied to reciprocator.	Check the Reciprocator control screen for the lockout indicator. Lockout is applied from the Configuration screens.
	iControl lockout applied to guns, in/out positioners, and reciprocators.	This is a normal condition unless a failure has occurred. Refer to *Photoeye, Encoder, and Interlock Troubleshooting* in this section.

Continued...

Problem	Cause	Correction
No movement from reciprocator in response to move command *(continued)*	Remote disable applied to reciprocator controller. No status display on iControl screens.	If Nordson USA ColorMax system: Disable action is applied by a remote system control panel keyswitch. In the Disable position, the keyswitch opens the disable input circuit at the controller. No corrective action is required unless the keyswitch Normal position does not allow motion. Refer to your system drawings for circuit details. If not Nordson USA ColorMax system: Apply jumper to force On the remote disable input. Refer to system drawings for jumper application.
No reciprocator response when Auto mode selected	A fault has occurred preventing Auto operation.	Check iControl alarm screen. Identify the fault and correct. Review the related faults and corrections listed in this table.
	iControl reciprocator configuration settings have not been completed.	Refer to *Network Configuration* and *Reciprocator Configuration* in the iControl Operator Interface manual. Make sure all required settings have been made and are correct. Refer to the In/Out Positioner/Reciprocator Control Panel drawings in Section 7 of this manual and make sure all connections have been made correctly.
Reciprocator changes direction before or after the programmed turn-around position in Auto mode	Turn-around offset not set correctly.	An error close to ± $^1/_2$ in. of the set turn-around position is normal. Before making adjustments to the offset setting, make sure the encoder resolution is correct. Refer to *Reciprocator Configuration* in the iControl Operator Interface manual.
	Incorrect reciprocator encoder resolution entered.	The accuracy of the displayed position versus the actual position of the reciprocator is determined by the configured encoder resolution. Check the encoder resolution value.
Reciprocator does not display 0.0 position after the homing process	Reciprocator has overtraveled the position slightly before coming to a stop	This is normal. The position displayed after homing is the actual position. During homing, the 0.0 position is set at the forward limit, then the reciprocator moves down 1 inch before stopping. The stop action produces the overtravel.

Continued...

Problem	Cause	Correction
Reciprocator measured travel position does not match the value shown on the reciprocator control panel or configuration screen	Reciprocator not homed.	Touch the Home button and wait for the homing sequence to finish, then check the position accuracy. The displayed position will not be correct until the reciprocator is homed.
	Incorrect reciprocator encoder value entered.	The accuracy of the displayed position versus the actual position of the reciprocator is determined by the configured encoder resolution. Check the encoder resolution value.
	Belt drive sprocket slipping.	Make sure the drive belt sprocket is securely connected to the gear reducer output shaft.
Reciprocator does not move in response to move command	Refer to condition “No movement from reciprocator in response to move command.”	
	Mechanical failure, drive belt not engaging drive sprocket, or drive sprocket slipping.	The position value changes but the reciprocator does not move. This can occur because the encoder is connected directly to the gear reducer output shaft. Check the drive belt and sprocket.
	Incorrect reciprocator speed controller parameters.	Speed controller parameters must be set to specified values in order to respond correctly to signals from reciprocator controller. Refer to the In/Out Positioner/Reciprocator Control Panel drawings in Section 7 of this manual.
No reciprocator response when Auto mode selected	Refer to condition “No reciprocator response when Auto mode selected.”	
	Auto cycle delay in progress	A 5 second delay occurs when Auto mode is selected. During the delay a warning beeper should sound.
	An end-of-travel limit switch is engaged.	Check the iControl Alarm log. Identify the fault and review the fault troubleshooting information.
	Invalid reciprocator stroke settings.	Speed controller parameters must be set to accept commands from the reciprocator controller. Refer to the In/Out Positioner/Reciprocator Control Panel drawings in Section 7 of this manual.
Reciprocator “jumps” back to a stop after moving to a new position	Reciprocator Hysteresis value too small.	Open Reciprocator Configuration screen and increase the Hysteresis value. The hysteresis value is the allowable over- or under-shoot distance from the target position. If the reciprocator is within this distance of the desired position when it stops, the iControl system will not move it again to the target position. If the value is not large enough, the reciprocator will over- or under-shoot its destination and then “jump” back to it (called hunting). A typical setting is 0.5 – 0.7 inches depending on the reciprocator speed setting.

Other Fault Messages and Conditions

Table 4-11 Other Fault Messages and Conditions

Message or Condition	Cause/Correction
Message: Too many (few) control nodes found	The number of gun cards/iFlow modules does not match the number of guns setting in Guns Configuration screen (System Configuration). This could be a normal condition if you have an odd number of guns in your system. The red Fault LED on the gun card will light if two guns are not connected to the card.
Message: Failure reading database	No data or configuration displays on screens. User data card missing, defective, or wrong size. Replace the card. Compact Flash adapter failure. Replace the adapter.
Condition: iControl screen partially boots up. Screen is blank except for possible text display, or screen displays “Hit ESC for .altboot...”	Program card is missing, blank, or defective. Replace the card. Program card in wrong adapter slot. Insert the program card in the outer slot. Compact Flash adapter failure. Replace the adapter. No power to Compact Flash adapter. Check the power cable and connection to the adapter. Check the ribbon cable connections to the Compact Flash adapter and PC. Replace the ribbon cable if necessary. (Standard 40-pin IDE cable, not available from Nordson.)
Condition: Pickoff value is reset to smaller number after entry	The maximum pickoff length is 4096 inches (104038.4 mm). With the keypad you can enter a number larger than the maximum, but when you save your entry the value will be automatically reduced to the maximum value.
Condition: Inconsistent lead and lag timing for auto gun triggering or moving	Conveyor encoder pulse rate is too fast. Maximum is 10 Hz (10 pulses/second). Some pulses are not being detected. Reduce the conveyor speed or change the encoder-to-conveyor linkage to reduce the pulse frequency.
Condition: Lockout message does not display when keyswitch turned to lockout position, or lockout cannot be canceled by turning keyswitch to another position	Booth exhaust fan is off (turning off switched power to the console), or remote lockout is on. If the exhaust fan is turned off before turning the switch to Lockout, then lockout cannot be activated. If the fan is turned off after the switch is turned to Lockout, then lockout cannot be canceled. Turn fan on to correct. If the remote lockout is on, turn it off. Remote lockout is activated by a customer-supplied switching device connected to the remote lockout relay in the console.
Condition: iControl screen is locked up (no response)	Cycle console power. If the condition persists, the program card is corrupted. Obtain and install another program card. Refer to *Touch Screen Calibration* when installing new program cards.
Condition: Air flow when gun is not triggered on	iFlow module requires re-zeroing. Re-zero the iFlow module as described on page 4-12. iFlow module proportional valve or solenoid valve stuck open. Refer to the *Repair* section for instructions on cleaning the proportional valves. Solenoid valves must be replaced if they do not close.

Photoeye, Encoder, and Interlock Troubleshooting

Use the I/O board LEDs and the relay LEDs in the master console to troubleshoot problems with the photoeye, encoder, interlock, and alarm circuits.

Table 4-12 Photoeye, Encoder, and Interlock Troubleshooting

Inputs	I/O Board Terminals	Troubleshooting
Zone Photoeyes	1 – 8	Photoeyes are set for breaklight. When a part passes in front of the zone photoeyes, the LEDs for the zone photoeyes should light. If they do not, check the photoeye wiring and photoeyes.
Flag Photoeyes or scanners or Inputs from customer Part ID system	9 –16	Photoeyes and scanners are set for breaklight. When a flag passes in front of the photoeyes, the LEDs for those photoeyes blocked by the flag, or the LEDs receiving a signal from the customer part ID system should light. If they do not check the wiring and photoeyes or customer part ID system.
Encoder	20	The LED should flash at the same rate as the encoder signal. If it is not flashing when the conveyor is moving check the encoder wiring and encoder.
Conveyor Interlock	24	The LED should light as long as the conveyor is on or the keyswitch is in the bypass position. If it is not on check the conveyor interlock wiring. Without this signal the spray guns will not be triggered.
Relays (DIN rail)	–	The conveyor interlock relay LED lights when the conveyor is running. The remote lockout relay LED is lit as long as it is receiving a signal (lockout on). The alarm relay LED stays lit until an alarm occurs, then goes out.
All	1–24	Input LEDs should indicate as described above. If none of the LEDs will turn on, then check the following screens: Zone and Part ID Inputs: Open the Input Status screen. Inputs should display as lighted indicators. Encoder: On the Main screen, if the encoder is providing a signal then the conveyor speed should be greater than zero. Conveyor Input: On the Main screen, if the conveyor is running then the conveyor indicator should be green. If the input indicators on the Main and Input Status screens are lit but the I/O board LEDs are not, then: Check the dipswitch and jumper settings on the PC104 I/O board (see Figure 7-4 for the settings). If settings are correct, replace the PC104 I/O board, ribbon cable, and I/O board. A new cable is shipped with the I/O board. **WARNING**: Always turn console power off before changing jumper and dipswitch settings on circuit boards. If ribbon cable is not keyed, make sure the colored trace in the ribbon cable is aligned with pin 1 at both connectors. If the conveyor interlock LED (24) on the I/O board is operating correctly and all or some of LEDs 1–20 are responding erratically, then check the I/O board inputs common voltage. For sinking inputs, +24 Vdc is applied to all HI terminals on the board as inputs common.

Remote Node (FieldBus Controller/Coupler) Troubleshooting

Use the following tables and the LEDs on the FieldBus devices in the in/out positioner scanner junction box and in/out positioner / reciprocator control panels for assistance in troubleshooting them. Unless instructed otherwise, contact Nordson Finishing Technical Support for assistance.

FieldBus Status

Table 4-13 FieldBus Controller Status LEDs

LED	Meaning	Troubleshooting
ON		
Green	Fieldbus initialization is correct.	
Off	Fieldbus initialization is not correct, no function or self test.	Check the supply voltage (24V and 0V), check the IP configuration.
LINK		
Green	Link to the remote i/o network exists.	
Off	No link to the remote i/o network.	Check Ethernet connections and cables.
TxD/RxD		
Green	Data exchange taking place.	
Off	No data exchange.	Make sure the iControl console is powered on. Make sure the remote node has been configured by checking the Network Status screen and Node Configuration screen. Check the iControl Alarm screen for remove node fault messages.
ERROR		
Red	Error on the fieldbus.	
Off	No error, normal operation.	

Node Status

Table 4-14 FieldBus Controller Node Status LEDs

LED	Meaning	Troubleshooting
I/O		
Green	Fieldbus device operating normally.	
Red	During startup: Internal bus being initialized, LED flashes fast for 1–2 seconds.	
Red	After startup: Three consecutive flashing sequences with pauses between each indicate errors.	Refer to the fault codes, arguments, and description in Table 4-16, I/O Errors.
Orange	Failure of input or output module connected to controller.	Check I/O modules, replace if necessary.

Voltage LEDs

The two green LEDs in the FieldBus supply section display the supply voltage. The (A) LED indicates the 24 V supply; the (B) LED indicates the supply to the field side (power jumper contacts).

Table 4-15 FieldBus Controller Voltage LEDs

LED	Meaning	Troubleshooting
A		
Green	Operating voltage exists.	
Off	No operating voltage.	Check the supply voltage (24 V and 0 V)
B		
Green	Operating voltage for power jumper contacts exists.	
Off	No operating voltage for power jumper contacts.	Check the supply voltage (24 V and 0 V)

I/O Errors

If a fault is detected, the I/O LED blinks in three consecutive flash sequences: first a series of short flashes, then a pause, then the error code number, another pause, then the error code argument.

Table 4-16 FieldBus Controller I/O Fault LEDs

Fault Argument	Fault Description
Fault Code 1: Hardware and configuration fault	
0	EEPROM check sum fault/check sum fault in the parameter area of the flash memory.
1	Overflow of the internal buffer memory for the inline code.
2	Unknown data type.
3	Module type of the flash program memory could not be determined/is incorrect.
4	Fault when writing in the flash memory.
5	Fault when deleting in the flash memory.
6	Changed I/O module configuration determined after autoreset.
Fault Code 2: Fault in the programmed configuration	
0	Incorrect table entry.
Fault Code 3: Internal bus command fault	
0	No error argument.
Fault Code 4: Internal bus data fault	
0	Data fault on internal bus or internal bus interruption on coupler.
n* (n>0)	Internal bus interrupted after I/O module n.
Fault Code 5: Fault during register communication	
n*	Internal bus fault during register communication after I/O module n.
Fault Code 6: FieldBus specific error	
1	No reply from the BootP server.
2	Ethernet controller not recognized.
3	Invalid MAC ID.
4	TCP/IP initialization error.
Fault Code 7: I/O module not supported	
n*	I/O module at position n is not supported.
Fault Code 8: Not used	
Fault Code 9: CPU–TRAP error	
1	Illegal opcode.
2	Stack overflow.
3	Stack underflow.
4	NMI

Touch Screen Troubleshooting

Touch Screen Calibration

The touch screen is calibrated at the factory. If you change a program card, or the iControl PC, or have problems touching screen components accurately, you will have to recalibrate the screen.

The touch screen calibration values are stored on the program card. If you install a program card that has not been used before, there will be no calibration file on the card. The system will automatically start the calibration procedure.

NOTE: If you install a program card that was previously used on another iControl console, you MUST perform the *Calibration with a Mouse* procedure on the following page to calibrate the touch screen.

Normal Calibration

You can calibrate the touch screen at any time. To start a normal calibration, start the Program Shutdown procedure. When the operating system shutdown prompt appears on the screen, touch the Cancel button, then touch the CAL button.

Follow the calibration instructions on the screen exactly, using your finger to touch the targets. When you have completed the calibration procedure, touch the **iControl** button to start the iControl software.

Problems During Calibration

If you do not follow the calibration instructions exactly: You will not be able to touch the center **Completion** button and exit the calibration procedure. If this happens, stop and wait until the procedure times out. You should then be able to repeat the procedure and complete it correctly. When you have completed the calibration procedure, touch the **iControl** button to start the iControl software.

If console power is shut off during the calibration procedure: The calibration file on the program card will be corrupted. On power up, you will not be able to touch the CAL button to start the calibration procedure. If this happens, perform the *Calibration with a Mouse* procedure.

Calibration with a Mouse

WARNING: Do not spray powder while the console door is open. Shut off the booth exhaust fan to remove switched power from the console and prevent spray gun operation while performing this procedure. Failure to observe this warning could create a hazardous condition and could result in personal injury or property damage.

Use this procedure to recalibrate the touch screen if you cannot touch the CAL button or the buttons on the iControl screens, or if you install a program card previously used in another iControl console.

NOTE: You must shut off console power before connecting or disconnecting a mouse or keyboard from the iControl PC.

1. Turn off console power.
2. Open the iControl cabinet door and connect a mouse with a PS2 connector to the MOUSE port on left side of the iControl PC.
3. Turn on power and allow the operating system to load. The CAL button is displayed on the touch screen before the iControl software loads.
4. Use the mouse to move the cursor to the CAL button and click on it. The touch screen calibration procedure will start.

   NOTE: If you miss the CAL button, allow the iControl software to load, then, if possible, open the System Configuration screen and touch the Program Shutdown button. When the operating system shutdown prompt appears on the screen, touch the Cancel button, then the CAL button. If you cannot touch any buttons on the screen, then you will have to cycle console power and try again (go back to Step 1).

5. Once the calibration procedure starts, USE YOUR FINGER, NOT THE MOUSE, to touch the calibration targets, following the instructions on the screen carefully. When you have completed the calibration procedure, touch the iControl button to start the iControl software.
6. Test the touch screen calibration, then perform a program shutdown, turn off console power, and disconnect the mouse. Close the iControl cabinet door before re-starting the system.

No Touch Screen Display

Check the following:

- Check the power LED on the front bezel below the screen. If LED is not lit then PC is not powered up.
- Make sure the console power switch is on.
- Open the console door and make sure the PC power switch is on.

Have an electrician check these:

- Console fuses on the DIN rail, at the incoming power terminals.
- Unswitched power connections to the fuse blocks.
- Power supply to the console.

Touch Screen Failure

WARNING: Do not spray powder with the iControl console door open unless the console opening, the door, and all externally connected devices are out of the hazardous area surrounding any opening of the spray booth. The hazardous area extends 3 feet outward from an opening and continues in a 3 foot arc from the edge of an opening. Failure to observe this warning could create a hazardous condition and could result in personal injury or property damage.

Screens Display, but Touch Function Does Not Work

If the mouse pointer on the screen does not move to wherever you touch the screen, nothing happens when you touch buttons, and the touch screen cannot be calibrated, then the touch screen has failed. You must replace the iControl PC.

Temporary Fix: Shut off console power and connect a mouse with a PS2 connector to the MOUSE port of the left side of the iControl PC. Turn on console power and allow the system to boot up. You should now be able to use the mouse to point and click on screen buttons and data fields. Replace the iControl PC as soon as possible.

No Display

If the PC has power but nothing displays on the screen, then the screen has failed. You must replace the iControl PC.

Temporary Fix: Shut off console power and connect a VGA monitor, keyboard, and mouse to the PC ports. Turn console power on. If the boot screens and iControl screens display on the VGA monitor, you can use the mouse to click on buttons and select fields and use the keyboard to enter and change values. Replace the iControl PC as soon as possible.

Rotary Knob Troubleshooting

If rotating the knob on the keypad panel does not change the selected data field value, the signal from the knob is not being received by the iControl PC. If this happens, check the wiring connections from the keypad panel to the iControl PC. If the connections are good, replace the keypad panel.

WARNING: Do not spray powder with the iControl console door open unless the console opening, the door, and all externally connected devices are out of the hazardous area surrounding any opening of the spray booth. The hazardous area extends 3 feet outward from an opening and continues in a 3 foot arc from the edge of an opening. Failure to observe this warning could create a hazardous condition and could result in personal injury or property damage.

Temporary Fix: Perform a program shutdown and turn off console power. Connect a standard PC keyboard with a PS2 connector to the KEYBOARD port on the left side of the iControl PC. Turn on power and use the numeric keys to enter values in selected data fields, or use the up and down arrow keys to change field values. Replace the keypad as soon as possible.

Testing Ethernet Cables

A typical Ethernet cable test device consists of two separate units: a main unit and a remote unit. Use the main unit alone to test patch cables and both units to test cables after pulling them through conduit and connecting them to the termination modules.

Patch cables: These are short network cables used within electrical panels to make connections between Fieldbus controllers or couplers and field-terminated cable runs. Patch cables are factory assembled with male RJ-45 connectors at each end.

Cable runs: These are longer network cables that run through conduit to connect Fieldbus controllers or couplers to a common network interface device. Only one end of the cable has a male RJ-45 connection. The other end must be field-terminated to a termination module.

Refer to *Ethernet Network Installation* in the *Installation* section for more information about Ethernet cables and installation.

Local Test – Patch Cables

1. Connect both male RJ-45 connectors to the main unit.
2. Turn the unit on. A red LED will blink indicating a test in progress.
3. Watch the cable test LEDs. If all are green, then the cable is good. If one or more flash red, then the cable is faulty and must be replaced.

Remote Test – Cable Run

1. Connect one end of a previously tested patch cable into the termination module connected to the cable run. This provides you with two RJ-45 male connectors on the cable run to connect to the test unit.
2. Plug the other end of the patch cable into the remote unit.
3. Plug the RJ-45 male connector at the network interface end of the cable run into the main unit of the cable tester.
4. Turn the main unit on.
5. Watch the cable pair LEDs on the remote unit.
   - If all LEDs are green, then the cable run is good.
   - If one or more LEDs flash red, then either the termination module connections are miswired or incomplete, or the cable is faulty.

Make sure the cable connections to the termination module are correct. Check each connection. If you suspect a bad connection, you can pull the lead out of the module and punch it down again closer to the jacket.

If the termination module connections are good, then the cable is faulty and must be replaced.

Section 5
Repair

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

CAUTION: Do not turn off console power without first performing a program shutdown. Doing so could corrupt the iControl program and operating system on the program card. Refer to *Program Shutdown* in the *Configuration* section of the *iControl Operator Interface* manual for the shutdown procedure.

WARNING: Hazardous voltages exist within the iControl console. Unless power must be on to test circuits, always shut off and lock out power before opening the console to make repairs. All repairs should be made by a qualified electrician. Failure to observe this warning could result in personal injury or death.

Repair consists of removing malfunctioning components and replacing them with new ones. There are no components inside the cabinet that can be repaired by the customer except for the flow module.

Refer to the pneumatic and wiring diagrams in Section 7 for connections.

WARNING: Whenever replacing a component that interfaces with the exterior of the cabinet, such as an iFlow digital flow module, make sure that the dust-tight integrity of the cabinet is intact by installing the correct gaskets and seals. Failure to maintain the dust-tight integrity of the cabinet could invalidate agency approvals and create a hazardous condition.

Flow Module Repair

Repair of the flow module is limited to

- cleaning or replacing the proportional valve
- replacing the gun air solenoid valve

Field replacement of other parts is not possible, due to the need to calibrate the module at the factory using equipment not available to the field.

CAUTION: The module circuit cards are electrostatic sensitive devices (ESD). To prevent damage to the cards when handling them, wear a grounding wrist strap connected to the iControl enclosure or other ground. Handle the cards only by their edges.

Proportional Valve Cleaning

See Figure 5-1. A dirty air supply can cause the proportional valve (6) to malfunction. Follow these instructions to disassemble and clean the valve.

1. Disconnect the coil (3) wiring from the circuit board (1). Remove the nut (2) and coil from the proportional valve (6).
2. Remove the two long screws (4) to remove the proportional valve from the manifold.

CAUTION: The valve parts are very small, be careful not to lose any. Do not mix the springs from one valve with those from another. The valves are calibrated for different springs.

3. Remove the two short screws (5), then remove the valve stem (9) from the valve body (12).
4. Remove the valve cartridge (11) and spring (10) from the stem.
5. Clean the cartridge seat and seals, and the orifice in the valve body. Use low-pressure compressed air. Do not use sharp metal tools to clean the cartridge or valve body.
6. Install the spring and then the cartridge in the stem, with the plastic seat on the end of the cartridge facing out.
7. Make sure the O-rings furnished with the valve are in place on the bottom of the valve body.
8. Secure the valve body to the manifold with the long screws, making sure the arrow on the side of the body points toward the outlet fittings.
9. Install the coil over the valve stem, with the coil wiring pointing toward the circuit board. Secure the coil with the nut.
10. Connect the coil wiring to the circuit board.

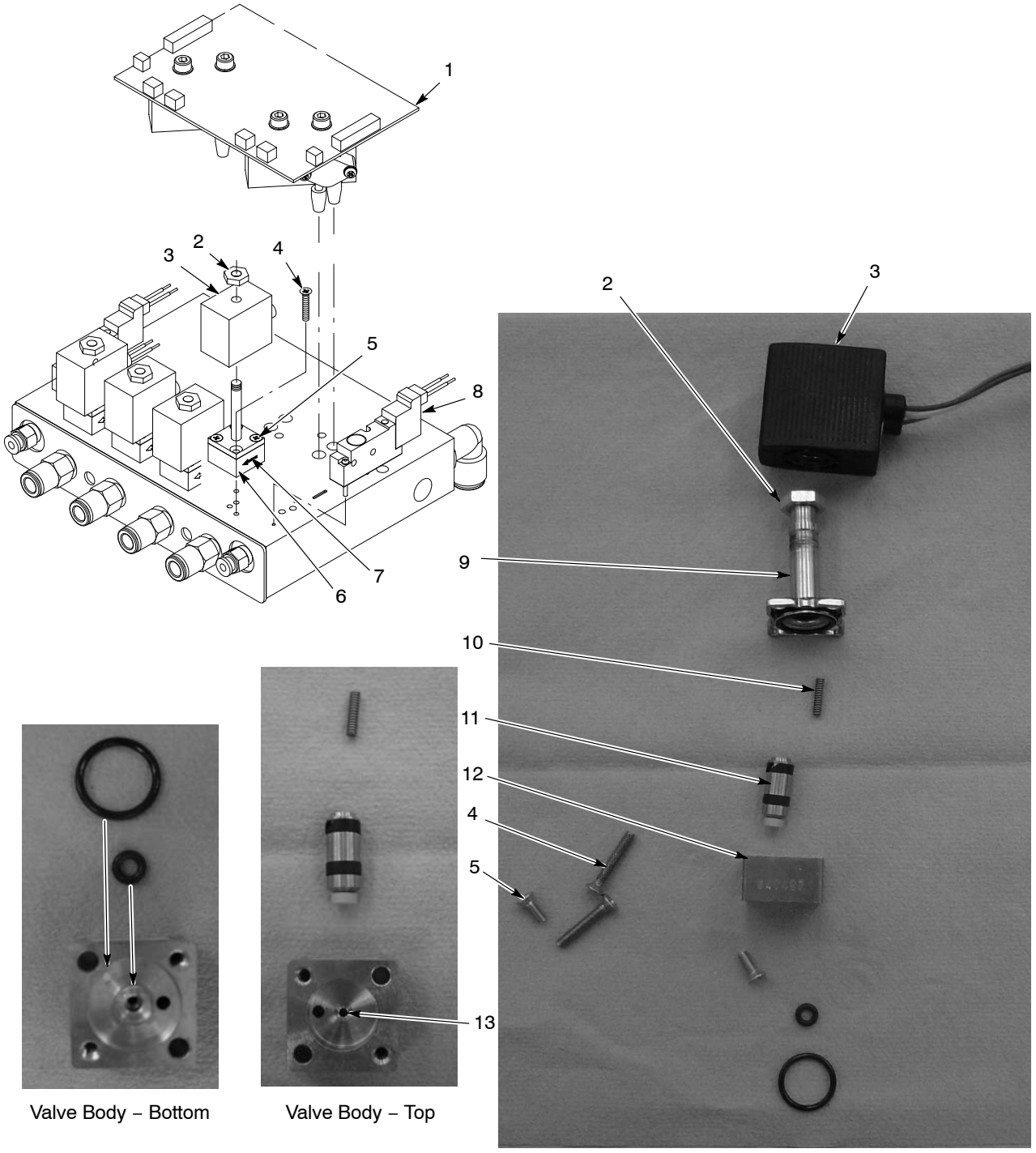


Figure 5-1 iFlow Module Proportional Valve Removal and Replacement

1. Circuit board (shown removed for clarity)
2. Nut–coil to proportional valve (4)
3. Coil–proportional valve (4)
4. Long screws–valve to manifold (2)
5. Short screws–valve stem to body (2)
6. Proportional valve (4)
7. Direction of flow arrow
8. Gun air solenoid valve (2)
9. Stem
10. Spring
11. Cartridge
12. Valve body
13. Orifice

Proportional Valve Replacement

If cleaning the proportional valve does not correct the flow problem then replace the valve. Remove the valve by performing steps 1 and 2 of *Proportional Valve Cleaning*.

Before installing a new valve, remove the protective cover from the bottom of the valve body. Be careful to not lose the O-rings under the cover.

Gun Air Solenoid Valve Replacement

See Figure 5-1. To remove the gun air solenoid valves (8), remove the two screws in the valve body and lift the valve off the manifold.

Make sure the O-rings furnished with the new valve are in place before installing the new valve on the manifold.

Gun Control Card Removal/Installation

Replacing a Gun Control Card

WARNING: Do not remove gun control cards from the card cage while they are powered. Either shut off console power or shut off the booth exhaust fan so that the interlock will remove power from the gun control cards. Failure to observe this warning could result in damage to the cards.

CAUTION: Do not turn off console power without first performing a program shutdown. Doing so could corrupt the iControl program and operating system on the program card. Refer to *Program Shutdown* in the *Configuration* section of the *iControl Operator Interface* manual for the shutdown procedure.

CAUTION: The gun control cards are electrostatic sensitive devices (ESD). To prevent damage to the cards when handling them, wear a grounding wrist strap connected to the iControl enclosure or other ground. Handle the cards only by their top and bottom edges.

See Figure 5-2. Gun control cards (2) are installed in the card cage from left to right. Each card controls two guns: the bottom receptacle is the odd gun number; the top receptacle is the even gun number.

To remove a card, disconnect the gun harness connectors (3 and 4), pull down the locking tab (5), then pull the card out of the card cage.

To install a new card, slide the card into the slots in the card cage and seat the card's finger board firmly into the connector slot on the backplane (6). Push the locking tab up to lock the card into the card cage. Connect the gun harness to the two receptacles on the card.

Adding Guns

If the console has an odd number of guns you can add another gun without adding another gun control card. If your console has an even number of guns less than 16, you can add more guns by installing a new gun control card in an unused slot. Refer to *System Upgrades* in the *Installation* section for more information on adding guns to an existing system.

For either scenario, you must open the Guns and Consoles configuration screen, increase the number of guns, and reboot the system before the new guns will be recognized.

NOTE: Cards are installed in the card cage from left to right. Guns are numbered from left to right and bottom to top.

Replacing A Card

If you are replacing an existing card, turn off the booth exhaust fan first, then replace the card. When you turn on the booth exhaust fan, the green watchdog LED should blink. Since the card ID has changed the red fault LED on the card will light and a fault message will appear on the Alarm screen. To reset the fault LED, open the Alarm screen and touch the Clear All Faults button.

2 4 6 8 10 12 14 16
1 3 5 7 9 11 13 15
Gun Order in Card Cage

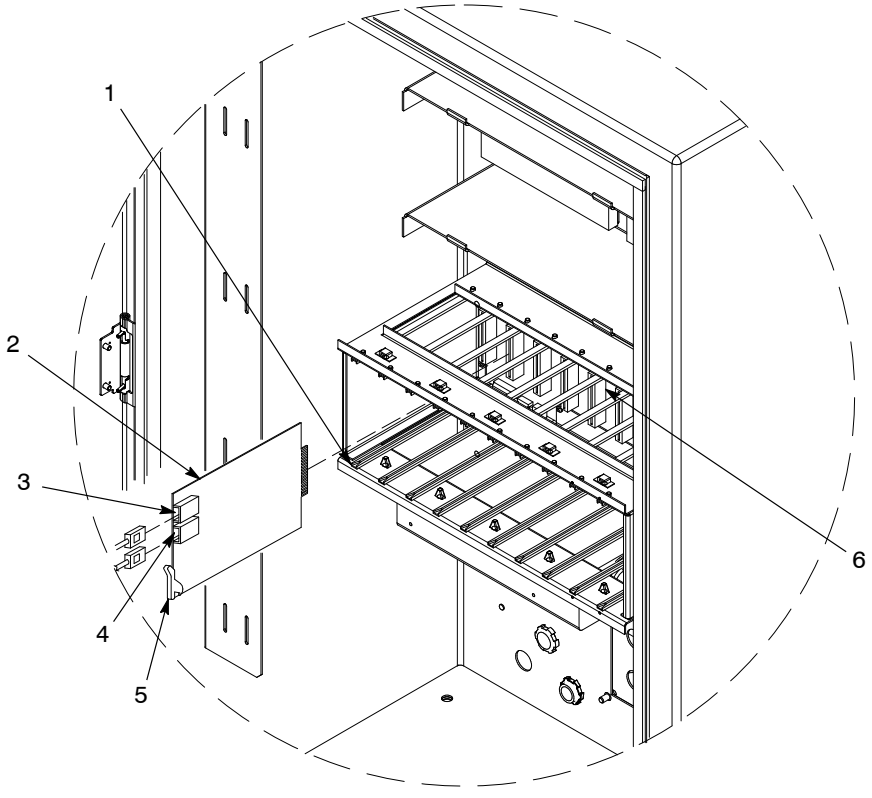


Figure 5-2 Gun Control Card Replacement

1. Card cage (slot 1)
2. Gun control card
3. Gun 2 connector
4. Gun 1 connector
5. Locking tab
6. Backplane

Ribbon Cable Connections

CAUTION: Plugging in a ribbon cable the wrong way may damage the cable or the circuit boards when power is applied. Reversing the ribbon cable polarity of the cable from the iControl computer to the I/O card will cause catastrophic failure of the iControl unit. Make sure the cables are connected correctly.

The ribbon cables are keyed so that they can only be plugged in one way. If the cables are not keyed, replace them as soon as possible with keyed cables. I/O card replacements are shipped with a new cable.

The ribbon cables usually have a red or blue tracer that designates the pin1 side of the cable. Plug the cables into the circuit boards with the tracer aligned with pin 1 on the board. Pin 1 is designated by a 1 printed on the I/O board and a square on the computer.

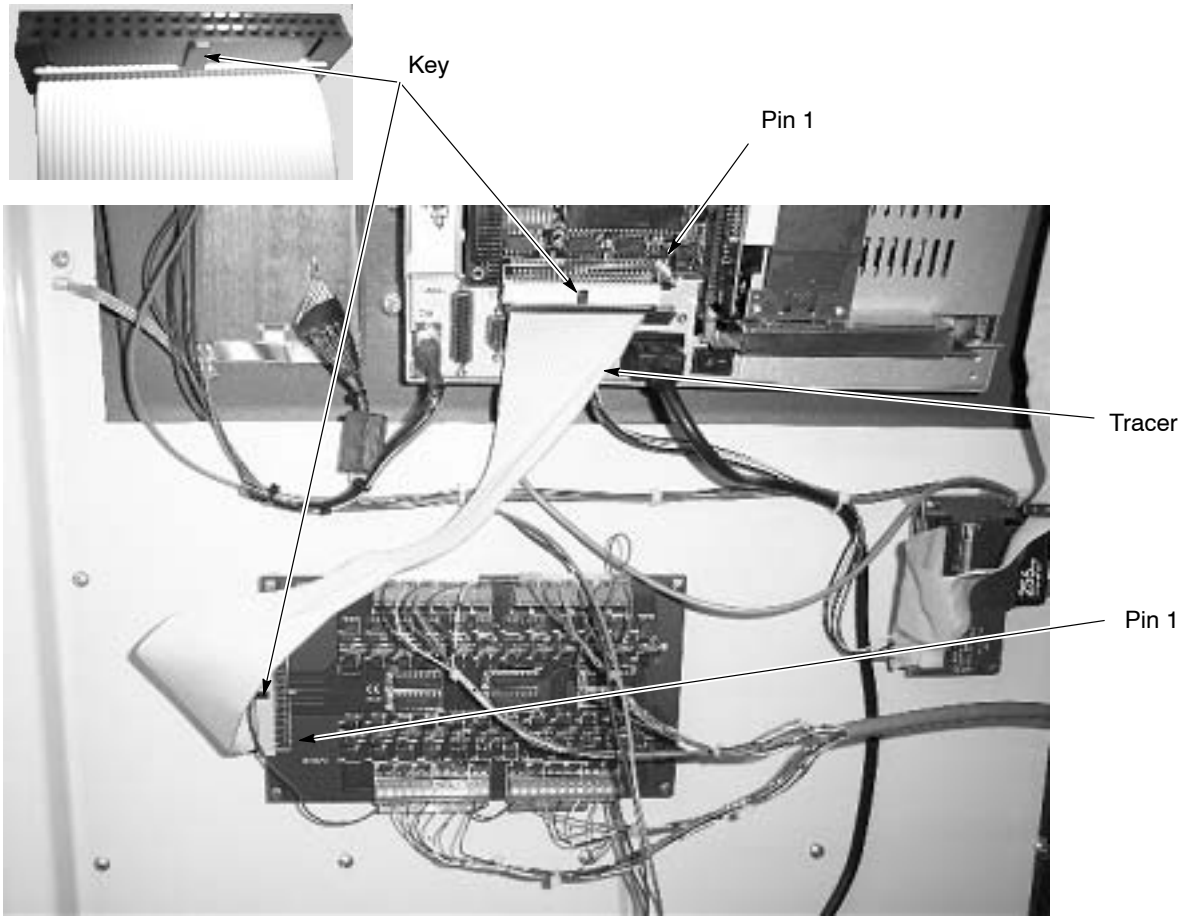


Figure 5-3 Computer–I/O Board Ribbon Cable Connections

Section 6
Parts

Introduction

To order parts, call the Nordson Finishing Customer Support Center or your local Nordson representative.

Finishing Customer Support Center
Telephone: (800) 433–9319
Facsimile: (888) 229–4580
Email: finishing_csc@nordson.com

Consoles

Part	Description	Note
Master Consoles		
1072697	Controller, iControl, 4 gun, w/cpu	
1078231	Controller, iControl, 4 gun, w/cpu, w/ac	
1040483	Controller, iControl, 6 gun, w/cpu	
1078234	Controller, iControl, 6 gun, w/cpu, w/ac	
1042992	Controller, iControl, 8 gun, w/cpu	
1078238	Controller, iControl, 8 gun, w/cpu, w/ac	
1042994	Controller, iControl, 10 gun, w/cpu	
1078216	Controller, iControl, 10 gun, w/cpu, w/ac	
1042996	Controller, iControl, 12 gun, w/cpu	
1078220	Controller, iControl, 12 gun, w/cpu, w/ac	
1042998	Controller, iControl, 14 gun, w/cpu	
1078224	Controller, iControl, 14 gun, w/cpu, w/ac	
1043050	Controller, iControl, 16 gun, w/cpu	
1078228	Controller, iControl, 16 gun, w/cpu, w/ac	
Slave Consoles		
1072698	Controller, iControl, 4 gun, w/o cpu	
1078232	Controller, iControl, 4 gun, w/o cpu, w/ac	
1042716	Controller, iControl, 6 gun, w/o cpu	
1078236	Controller, iControl, 6 gun, w/o cpu, w/ac	
1042993	Controller, iControl, 8 gun, w/o cpu	
1078240	Controller, iControl, 8 gun, w/o cpu, w/ac	
1042995	Controller, iControl, 10 gun, w/o cpu	
1078218	Controller, iControl, 10 gun, w/o cpu, w/ac	
1042997	Controller, iControl,12 gun, w/o cpu	
1078222	Controller, iControl, 12 gun, w/o cpu, w/ac	
1042999	Controller, iControl, 14 gun, w/o cpu	
1078226	Controller, iControl, 14 gun, w/o cpu, w/ac	
1043051	Controller, iControl, 16 gun, w/o cpu	
1078230	Controller, iControl, 16 gun, w/o cpu, w/ac	

Console Parts

Figures 6-1 through 6-7 show the replaceable parts for both master and slave consoles. Contact your Nordson representative or Nordson Customer Support for help in obtaining unlisted parts.

Refer to Section 7 for pneumatic and electrical diagrams.

See Figures 6-1 and 6-3 for the parts listed in this table:

Item	Part	Description	Quantity	Note
1	1034033	SCREW, pan head, recessed, M6 x 10, zinc	24	
2	983128	WASHER, lock, internal, M6, steel, zinc	16	
3	1036657	MODULE, digital airflow control	AR	A
4	1073381	PLATE, blank, enclosure	AR	A
5	------	GASKET, module, digital airflow control	AR	A
6	982802	SCREW, socket, M5 x 70, black	AR	A
7	1033878	REGULATOR, rolling diaphragm, 0–120, $^1/_2$ in.	AR	A, B
8	972240	CONNECTOR, male, elbow, 12 mm tube x $^1/_2$ in.	AR	A
9	1034000	FITTING, $^1/_2$ in. RPT x (4) 10 mm tube	AR	A
10	148256	PLUG, 10 mm tubing	AR	A
11	------	WASHER, flat, M8, zinc	4	
12	------	WASHER, lock, split, M8, zinc	4	
13	------	SCREW, button head, socket, M8 x 12	4	
14	1023877	PCA, dual gun driver, iControl	AR	A
14A	------	JUMPER, gun ID, odd number	AR	D
15	1031501	RECEPTACLE, 8 position, gun, 70 in.	AR	A, C
15A	1023695	SEAL, bulkhead, $^7/_8$–16 thread	AR	C

NOTE A: Quantities of noted parts depends on system configuration and console type.

B: New regulators must be calibrated using iFlow air flow verification kit. Refer to *Miscellaneous Kits* on page 6-13.

C: Use to cap unused receptacles. One seal is shipped with each console. See Figure 6-3.

D: Use to prevent fault LED from lighting when odd number of guns are connected. Plug into gun card receptacle in place of receptacle harness for unused receptacle. One jumper is shipped with each console.

AR: As Required

Continued...

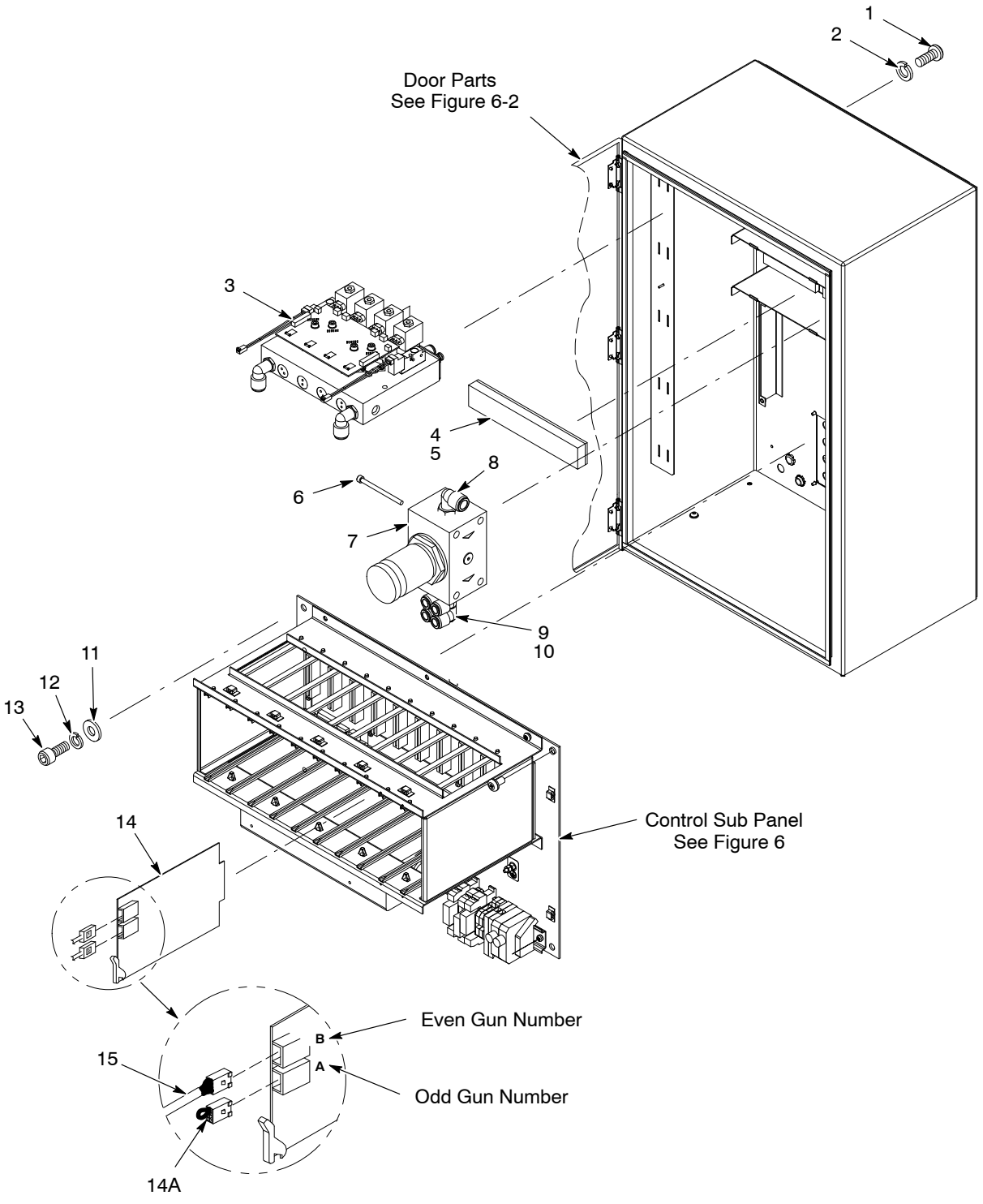


Figure 6-1 Console Parts (1 of 5)

Console Parts *(contd)*

See Figure 6-2 for the parts listed in this table:

Item	Part	Description	Quantity	Note
16	1077555	CONTROL UNIT, PC, panel mount, w/Ethernet	1	A
65	1051544	• INTERFACE CARD, PC104 CAN	1	B
66	1051545	• CARD, I/O, PC104	1	B
67	1076186	CARD, PCI Ethernet, iControl, Prodigy	1	
17	1000594	SWITCH, keylock, 3 position	1	
18	1000595	CONTACT block, 1-N.O. and 1-N.C. contact	2	
19	1036690	PANEL, keypad, iControl	1	
20	1032274	MODULE, 24 channel opto-isolated digital input	1	
21	1032390	JUMPER, comb type, 6 pole, 10 mm	AR	C
22	1036629	ADAPTER, CompactFlash, dual	1	D
23	1034281	MEMORY, CompactFlash	1	
24	1034283	MEMORY, programmed, iControl	1	
25	240674	TAG, ground	AR	C
26	983401	WASHER, lock, split, M5, steel, zinc	AR	C
27	984702	NUT, hex, M5, brass	AR	C
28	288806	CONTACT BLOCK, 2 N.O. contacts	1	
29	334806	SWITCH, round, 2 position, 90 degree	1	
63	1051542	CABLE, IDE, 80-conductor	1	
64	1051543	CABLE, power supply, Compact Flash adapter	1	
NS	1055881	CABLE, CAT5 Ethernet, T568B colors, 30 ft	1	

NOTE A: For refurbished control unit, order part number 1071310.

B: Included with control unit.

C: Quantities of noted parts depends on system configuration and console type.

D: See Figure 6-2. If replacing old-style adapter with two eject buttons, order 1036629, which includes new-style adapter, mounting plate and fasteners, power supply adapter cable, and power supply cable (item 64). If new-style adapter (one eject button) is being replaced, order 1072833.

AR: As Required

Continued...

NOTE: Item 16 shown without cover.

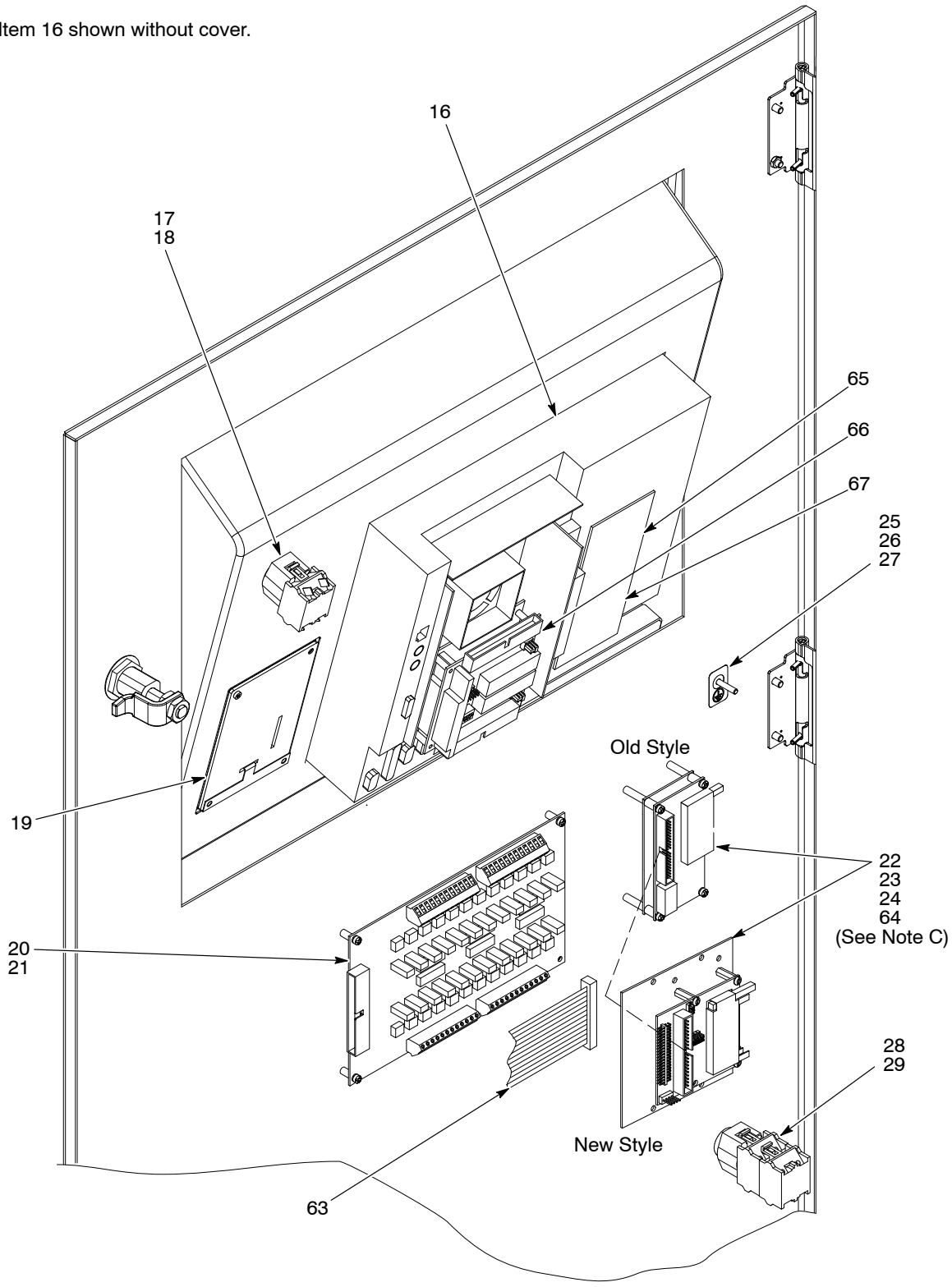


Figure 6-2 Console Parts (2 of 5)

Console Parts *(contd)*

See Figure 6-3 for the parts listed in this table:

Item	Part	Description	Quantity	Note
30	183418	PLUG, 12 mm, tube	AR	A
31	971106	CONNECTOR, male, 12 mm tube x $^1/_2$ in. unithread	AR	A
32	------	GASKET, manifold, iControl	1	
33	973442	PLUG, pipe, socket, flush, $^3/_4$ in. NPT, zinc	1	
34	984526	NUT, lock, $^1/_2$ in. conduit	AR	A
35	334800	PLUG, $^1/_2$ in. pipe, 1 in. hex	AR	A
36	939122	SEAL, conduit fitting, $^1/_2$ in.	AR	A
37	241040	MUFFLER, air, $^1/_8$ in. NPT	1	
38	344252	VALVE, check, M8T x R18, M output	1	
39	972105	CONNECTOR, male, 37, 1 $^1/_{16}$–12 x $^3/_4$ in., steel	1	
40	973227	ELBOW, $^3/_4$ in. mallable, galvanized	1	
41	324343	CONNECTOR, conduit, straight, 0.50 in.	2	
42	248375	CONDUIT, flexible, bulk, $^1/_2$ in.	AR	C
NS	------	FITTING, liquid tight, elbow, $^3/_4$ in., 45 degree	1	
NS	------	CONDUIT, flexible, bulk, $^3/_4$ in.	AR	
NS	272058	SEAL, conduit fitting, $^3/_4$ in.	1	
NS	900740	TUBING, polyurethane, 10/6.5–7 mm	AR	C
NS	226690	TUBING, polyurethane, 12/8mm, blue	AR	C
NS	240976	CLAMP, ground, with wire	1	
NS	802060	HOSE, 5 ft	1	

NOTE A: Quantities of noted parts depends on system configuration and console type.
C: Order in increments of one foot.
AR: As Required
NS: Not Shown

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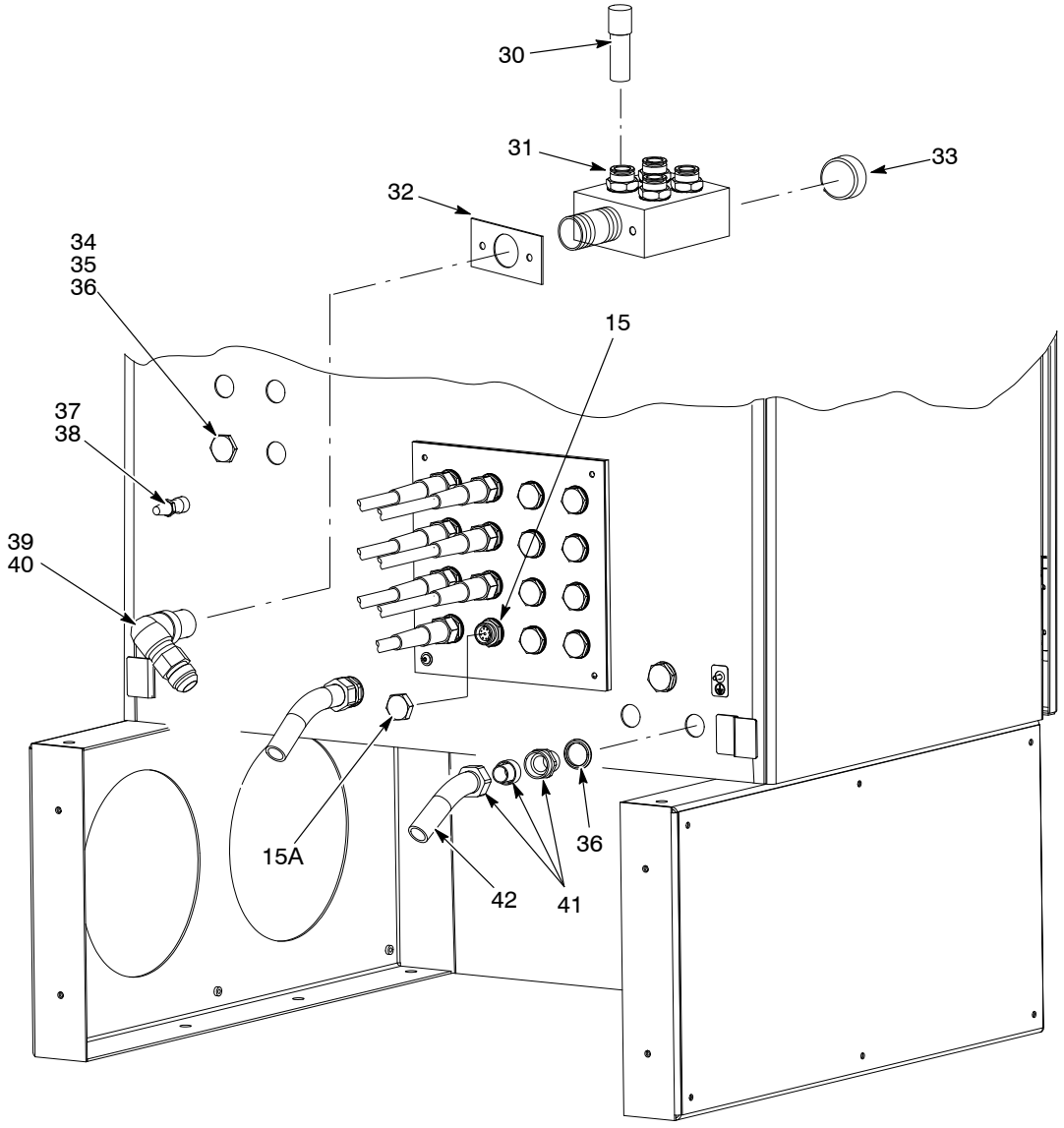

Figure 6-3 Console Parts (3 of 5)

Console Parts *(contd)*

See Figure 6-4 for the parts listed in this table:

Item	Part	Description	Quantity	Note
44	1023939	PCA, backplane, iControl	1	
45	982825	SCREW, pan head, recessed, M4 x 12, w/internal lockwasher	4	
46	320586	RESISTOR, MF, 20K, 1W, 5 AXL	2	
47	334805	FILTER, line, RFI, power, 10A	AR	A
48	227103	CABLE, twisted pair, 2-conductor, 22 AWG, 300V	AR	A, B
49	185034	CONNECTOR, terminal block, MC1, 5/ST, single row	AR	A
50	240674	TAG, ground	2	
51	983401	WASHER, lock, split, M5, steel, zinc	4	
52	983021	WASHER, flat, 0.203 x 0.406 x 0.040 in., brass	2	
53	984702	NUT, hex, M5, brass	2	
54	1027564	POWER SUPPLY, 400W, +24V, +/–12V, +5V	1	
55	983403	WASHER, lock, split, M4, steel, zinc	4	
56	982164	SCREW, pan head, slotted, M4 x 6, zinc	4	
57	1074468	ASSEMBLY, iControl power supply load resistor	1	C

NOTE A: Quantities of noted parts depends on system configuration and console type.
B: Order in increments of one foot.
C: Supplied with 4-gun consoles only.
AR: As Required

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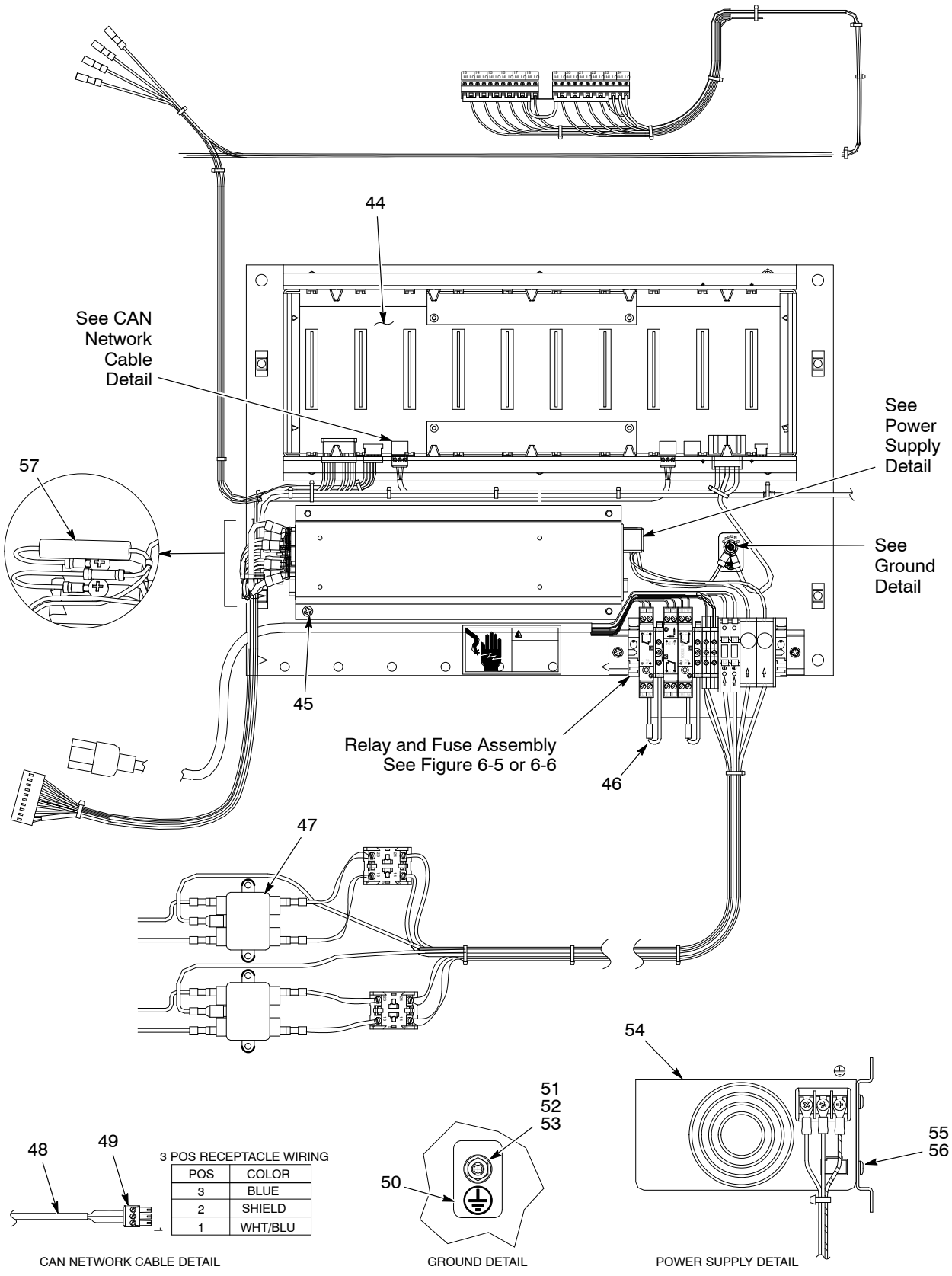

Figure 6-4 Console Parts (4 of 5)

Console Parts *(contd)*

Control Relays and Fuses – Old Style

Item	Part	Description	Quantity	Note
58	1034119	CONTROL RELAY, 120 VAC, NC, DIN mount	1	
59	320589	CONTROL RELAY, 24 VDC, NC, DIN mount	1	
60	320588	CONTROL RELAY, 120 VAC, open fixed	1	
61	939306	FUSE, 3.15, fast-acting, 250V, 5x20	2	
62	939709	FUSE, 10.0, fast-acting, 250V	2	
NS	320586	RESISTOR, MF, 20K, 1W, 5 AXL	2	

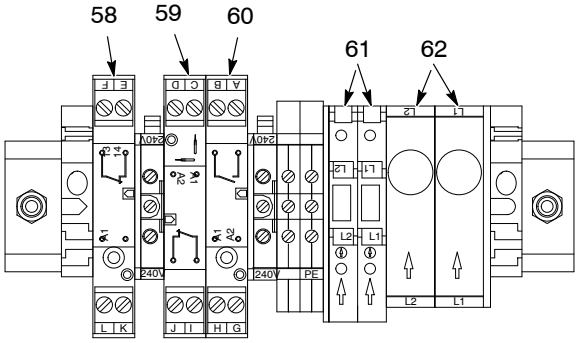

Figure 6-5 Old Style Control Relays and Fuses – Console Parts (5 of 5)

Control Relays and Fuses – New Style

Item	Part	Description	Quantity	Note
58	1068695	CONTROL RELAY, 115VAC/DC, 250V/6A, DIN-MT	2	
59	1068696	CONTROL RELAY, 24VDC, 250V/6A, DIN-MT	1	
61	939709	FUSE, 10.00, fast-acting, 250V	2	
62	939306	FUSE, 3.15, fast-acting, 250V, 5x20	2	
NS	320586	RESISTOR, MF, 20K, 1W, 5 AXL	2	

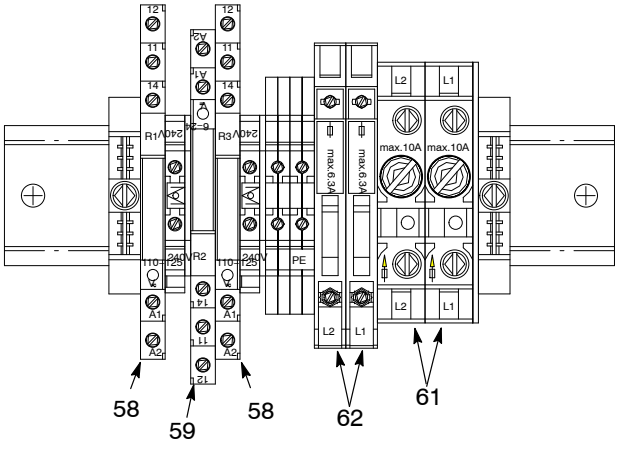

Figure 6-6 New Style Control Relays and Fuses – Console Parts (5 of 5)

Flow Module Parts

See Figure 6-7.

Item	Part	Description	Quantity	Note
–	1036657	MODULE, digital airflow control	1	
1	–––––––	• VALVE, solenoid	2	A
2	972125	• ELBOW, male, 10 mm tube x $^1/_4$ in. unithread	2	
3	1030873	• VALVE, check, M8T x R$^1/_8$, M input	4	
4	1033171	• CONNECTOR, orifice, 4mm x R$^1/_8$, dia 0.4mm	2	
5	1027547	• VALVE, proportional, solenoid, sub-base	4	
NOTE A: If using with an old board (1023932), order solenoid valve 1099302. If using with a new board (1099635), order solenoid valve 1099288.				

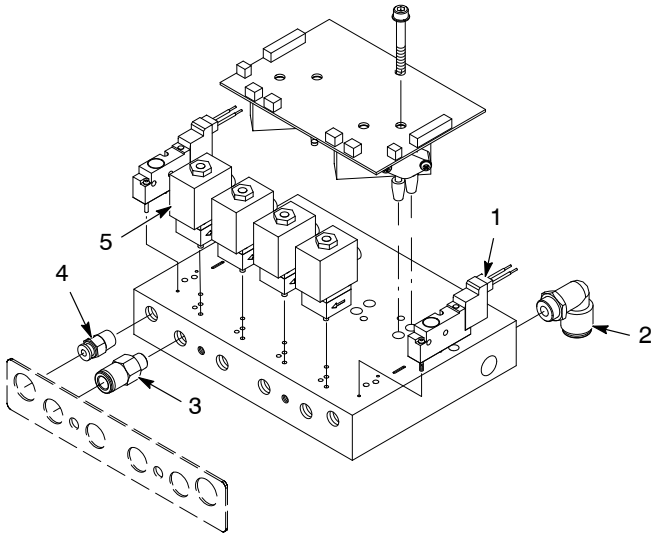

Figure 6-7 Flow Module Parts

Options

Adapter Cables for Versa-Spray and Tribomatic Spray Guns

Part	Description	Note
334783	ADAPTER, gun cable, Versa-Spray (black)	
341622	ADAPTER, gun cable, Versa-Spray, porcelain enamel (gray)	
334784	ADAPTER, gun cable, Tribomatic	

CAN Cable

Part	Description	Note
1057592	JACKETED CABLE, twisted pair, shielded, 24 AWG, 120 ohm	A
NOTE A: Order length desired in increments of one foot.		

Junction Boxes, Extension Boxes, and Control Panels

Part	Description	Note
1035897	JUNCTION BOX, photoeye, 30 watt, iControl	A
1035899	JUNCTION BOX, photoeye extension, iControl	A
1055890	JUNCTION BOX, scanner, in/out positioner, iControl	A
1057333	INTERFACE BOX, Ethernet network, iControl	A
1055889	CONTROL PANEL, in/out positioner, iControl	A, B
------	CONTROL PANEL, analog positioner, iControl	A, B
------	CONTROL PANEL, in/out positioner/reciprocator, iControl	A, B
------	CONTROL PANEL, in/out positioner, iControl (plug-in)	A, C
------	CONTROL PANEL, in/out positioner/reciprocator, iControl (plug-in)	A, C
------	CONTROL PANEL, top down positioner, iControl	
------	CONTROL PANEL, bottom up positioner, iControl	

NOTE A: Refer to Section 7, Wiring and Pneumatic Diagrams, for repair parts.
B: Use with Nutro-built (VO618N, VRnnRD models) positioners and reciprocators.
C: Use with Nordson positioners and reciprocators.

Ethernet Components

Part	Description	Note
1058222	CABLE, CAT 5 Ethernet, T568B colors, 100 ft	A
------	CABLE, CAT 5 Ethernet, T568B colors, 300 ft	A
1058224	MODULE, termination, CAT 5, T568B colors	

NOTE A: Cables have male connectors at each end. Refer to Section 3, Installation, for use.

Nozzle Purge Kits

Part	Description	Note
1035665	KIT, purge, single, controller	
1035666	KIT, purge, dual, controller	

Miscellaneous Kits

Part	Description	Note
1039881	KIT, tester, iFlow (air flow verification kit)	
1039886	KIT, boost, iControl (flow-rate air flow boost kit for PE spray guns)	

Recommended Air Filter for Use with iControl Systems

Part	Description	Note
1047526	Filter, gas and compressed air	
1047524	Element, filter	
1047525	Plate, port, 1 in., BSP	

Conveyor Encoder

Part	Description	Note
1074261	ENCODER, 24 PPR, w/cable	

Photocells and Scanners

Part	Description	Note
1037969	PHOTOCELL, wire goods	
131473	SENSOR, opposed mode emitter (Banner SM31E)	
131486	SENSOR, opposed mode receiver (Banner SM31R)	
170730	PHOTOCELL, retroreflective	
321158	CONTROLLER, analog, mini-array	
321159	CONTROLLER, discrete, mini-array	
321160	SENSOR, light emitter, 6 in., 3/4 in.beam spacing, 8 beam	
321161	SENSOR, light receiver, 6 in., 3/4 in.beam spacing, 8 beam	
------	SENSOR, light emitter, 12 in., 3/4 in.beam spacing, 16 beam	
------	SENSOR, light receiver, 12 in., 3/4 in.beam spacing, 16 beam	
321164	SENSOR, light emitter, 18 in., 3/4 in. beam spacing, 24 beam	
------	SENSOR, light receiver, 18 in., 3/4 in. beam spacing, 24 beam	
339739	SENSOR, light emitter, 24 in., 3/4 in. beam spacing, 32 beam	
339740	SENSOR, light receiver, 24 in., 3/4 in. beam spacing, 32 beam	
339741	SENSOR, light emitter, 30 in., 3/4 in. beam spacing, 40 beam	
339742	SENSOR, light receiver, 30 in., 3/4 in. beam spacing, 40 beam	
------	SENSOR, light emitter, 36 in., 3/4 in. beam spacing, 48 beam	
------	SENSOR, light receiver, 36 in., 3/4 in. beam spacing, 48 beam	
------	SENSOR, light emitter, 42 in., 3/4 in. beam spacing, 56 beam	
------	SENSOR, light receiver, 42 in., 3/4 in. beam spacing, 56 beam	
------	SENSOR, light emitter, 48 in., 3/4 in. beam spacing, 64 beam	
------	SENSOR, light receiver, 48 in., 3/4 in. beam spacing, 64 beam	
339749	SENSOR, light emitter, 60 in., 3/4 in. beam spacing, 80 beam	
339750	SENSOR, light receiver, 60 in., 3/4 in. beam spacing, 80 beam	
339751	SENSOR, light emitter, 72 in., 3/4 in. beam spacing, 96 beam	
339752	SENSOR, light receiver, 72 in., 3/4 in. beam spacing, 96 beam	

Photocell and Scanner Cables

Part	Description	Note
176429	SOW cable, 18–4	
321155	CABLE, scanner, 15 ft.	
321156	CABLE, scanner, 25 ft.	
321157	CABLE, scanner, 50 ft.	
343207	CABLE, scanner rated, 15 ft.	
347230	CABLE, input, 5 wire, 6 meter, male	

Section 7
Wiring and Pneumatic Diagrams

Diagram	Sheets
System Diagram	1
iControl Console Wiring Diagram (1042713)	5
iControl Console Pneumatic Diagram (1034090)	1
Photoeye Junction Box (1035897)	3
Extension Junction Box (1035899)	1
Network Interface Box (1057333)	1
In/Out Positioner Scanner Control Panel (1058890)	2
iControl In/Out Positioner Control Panel (1058889) (for Nutro-built positioners)	5
Analog (Retrofit) In/Out Positioner Control Panel (1055883)	4
iControl In/Out Positioner/Reciprocator Control Panel (1070103) (Nutro-built positioner with reciprocator)	6
iControl In/Out Positioner Control Panel (plug-in) (1098087) (for Nordson positioners)	6
iControl In/Out Positioner/Reciprocator Control Panel (plug-in) (1097160) (for Nordson positioner with reciprocator)	7
iControl Top Down Positioner Control Panel (1092923) (for Nutro-built positioner)	5
iControl Bottom Up Positioner Control Panel (1092924) (for Nutro-built positioner)	5

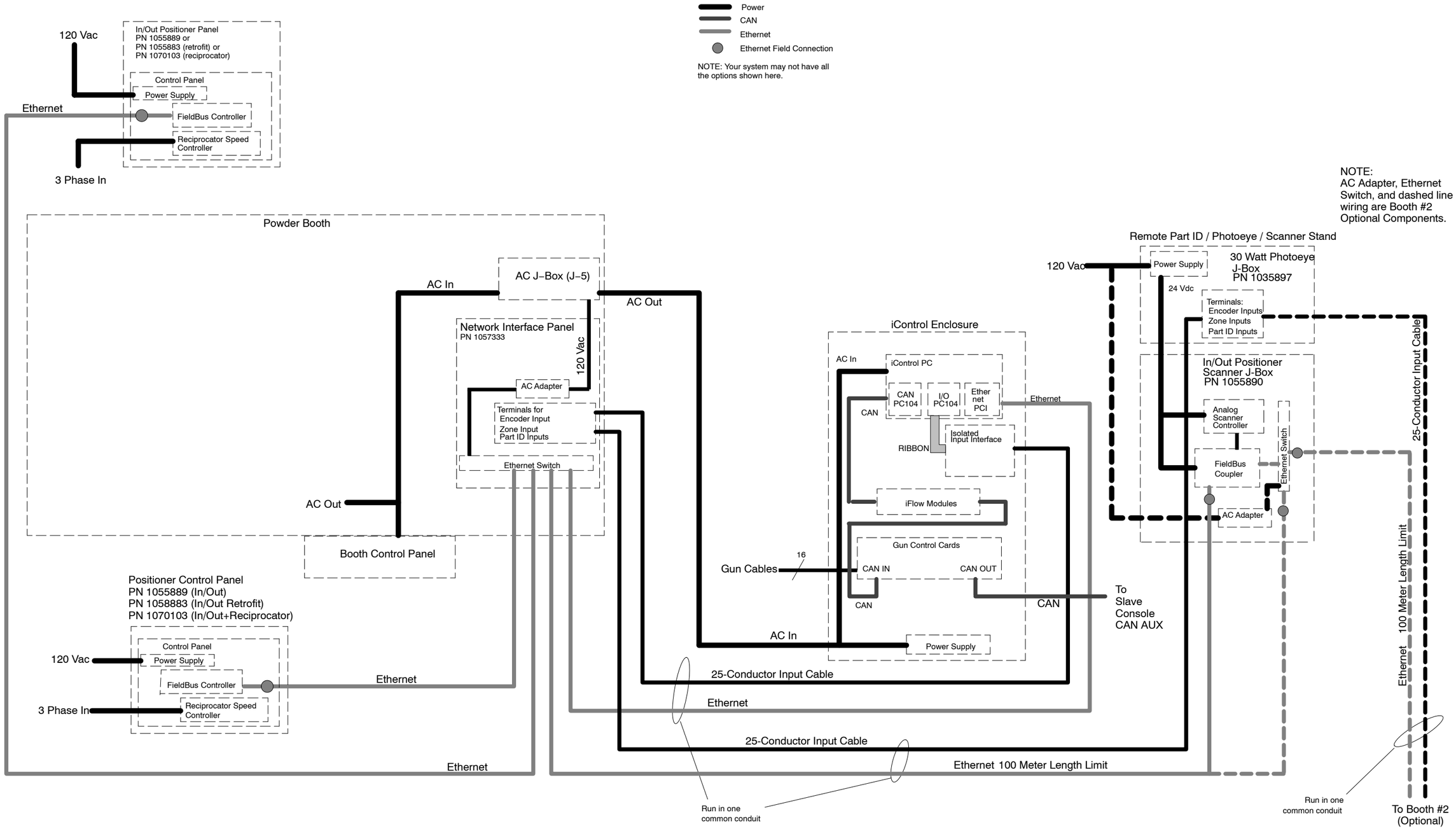

Figure 7-1 iControl System Diagram