Encore® iControl® 2 Integrated Control System

Installation, Troubleshooting, Repair

Customer Product Manual

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– English –
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Change Record

Revision	Date	Change
03	08/14	Updated part number 1603070 to 1605755.
04	09/14	Re-zero procedure revised
05	04/15	Removed part numbers from parts list.
06	11/15	Monitor design improvement
07	05/16	Added clarification to Console Power Cable Connections table. Updated wiring diagrams.
08	09/18	Updates to CompactFlash, part ID systems, troubleshooting, and PC battery replacment.
09	09/18	Added board kit to parts list.
10	09/18	Relay configurations.
11	09/18	Regulation label updates.
12	09/18	Added Rev 2 Arbor PC to parts list and sections regarding program and data cards. Updated wiring diagrams.
13	11/18	iControl 2 power supply updates (update to parts and wiring diagrams).
14	08/21	Updated filter.
15	05/22	Updated approvals information.
16	05/22	Updated schematics.
17	10/24	Updated manufacturer’s address.

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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 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.

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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 (SDS) 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.

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

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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.

Grounding inside and around the booth openings must comply with NFPA requirements for Class II, Division 1 or 2 Hazardous Locations. Refer to 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.

Action in the Event of a Malfunction

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

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

Disposal

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

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Safety Labels

Table 1-1 contains the text of the safety labels on the front of the iControl master and auxiliary cabinets and on the rear of the pedestal. 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.

Table 1-1 Safety Label Description

Item	Part	Description
1	1034161	**WARNING:** Disconnect power before servicing.

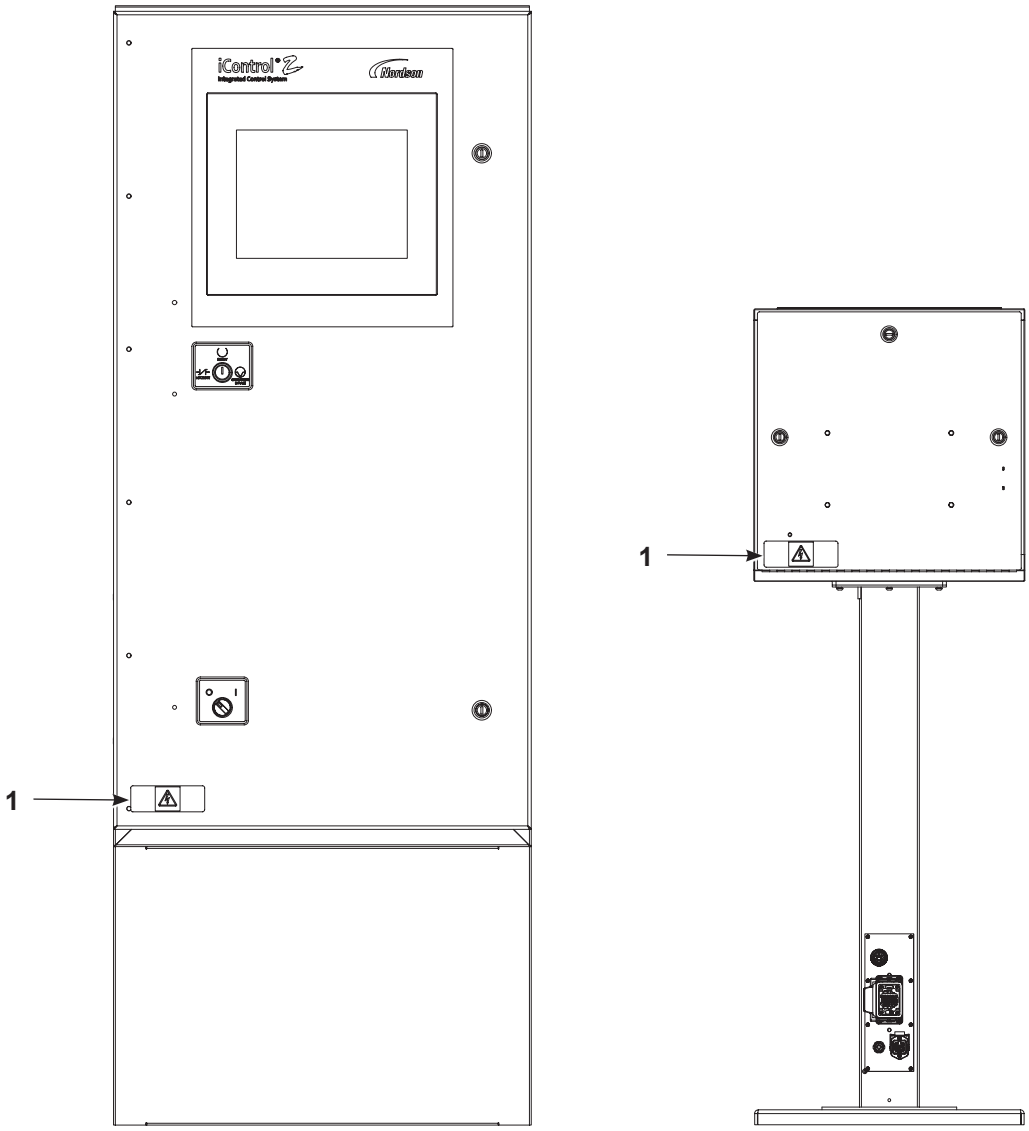


Figure 1-1 Safety Labels

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Section 2
Overview

System Manuals

This manual covers the iControl 2 system hardware for Encore® iControl® 2 systems used with Encore automatic spray guns.

iControl 2 manuals are organized as follows:

Operator Interface Manual: Covers configuration, preset setup, and operation using the iControl 2 software and touch screen.

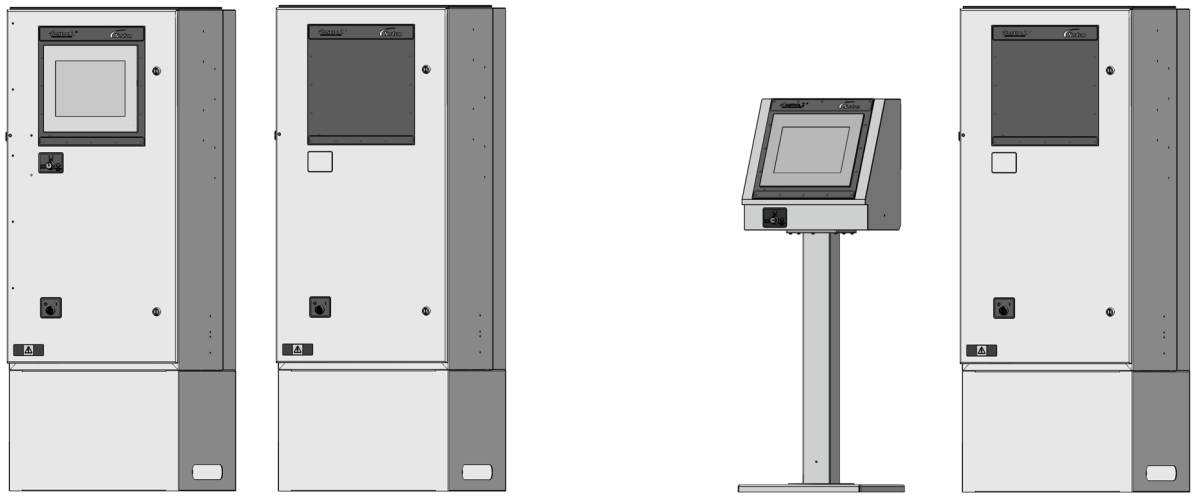
- 1056418

Operator Card: for all versions of the iControl 2 systems.

- 1024758

Hardware Manual: Covers installation, troubleshooting, repair, parts and drawings for this system only.

The Encore iControl 2 systems can consist of a main console (16 guns), a main console and auxiliary console (32 guns), a pedestal/main console (16 guns) or a pedestal/main and auxiliary consoles (32 guns).



Main−Auxiliary System **Pedestal/Main System**

Figure 2-1 iControl 2 Consoles and Pedestal Console and System Hardware and Software

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Console and System Hardware and Software

Main Console Components

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

- LCD touch-screen display, interlock keyswitch, and power switch.
- Computer (PC)
- Two CompactFlash cards, one for the iControl 2 program and one for user data
- I/O board and relay board
- backplane, card cage, and 8 gun control cards (1 card controls 2 guns)
- 400 watt and 120 watt 24Vdc power supplies
- 8 iFlow® digital flow modules (1 flow module supplies 2 guns)
- 4 preset precision regulators (one regulator supplies two flow modules)

Auxiliary Console Components

When the system has more than 16 guns, auxiliary consoles are added. Auxiliary consoles do not include the computer, display, interlock keyswitch, 60 watt power supply, I/O board, or relay board.

Pedestal / Main Components

The operator interface can be located in pedestal instead of the main console if desired. The pedestal houses the display, computer, interlock keyswitch, and I/O board, while all other hardware stays in the main console.

Standard System Functions

Standard iControl 2 system functions control gun triggering, electrostatic charging, and powder flow and velocity. Up to 255 part recipes (presets) can be created containing settings for each. In addition to the console/pedestal hardware, the iControl 2 system also requires external part ID sensors such as photoeyes or scanners for part identification and zone detection and a conveyor encoder to track part movement.

In addition, the iControl 2 system also controls in/out positioners and reciprocators. Recipes can include move settings for these devices.

Positioners move the guns in and out of the booth as parts pass through the booth. Positioner motion is typically horizontal but for some applications the positioners move the guns up and down. Reciprocators move the guns up and down with stroke lengths that vary depending on part size. For both, travel and motion is dependent on the recipe settings for the part.

Both positioners and reciprocators require analog scanner signals for accurate part width and height measurement.

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The spray guns can also be mounted on oscillators, which move up and down with fixed stroke lengths. Oscillators are typically controlled from the main system control panel.

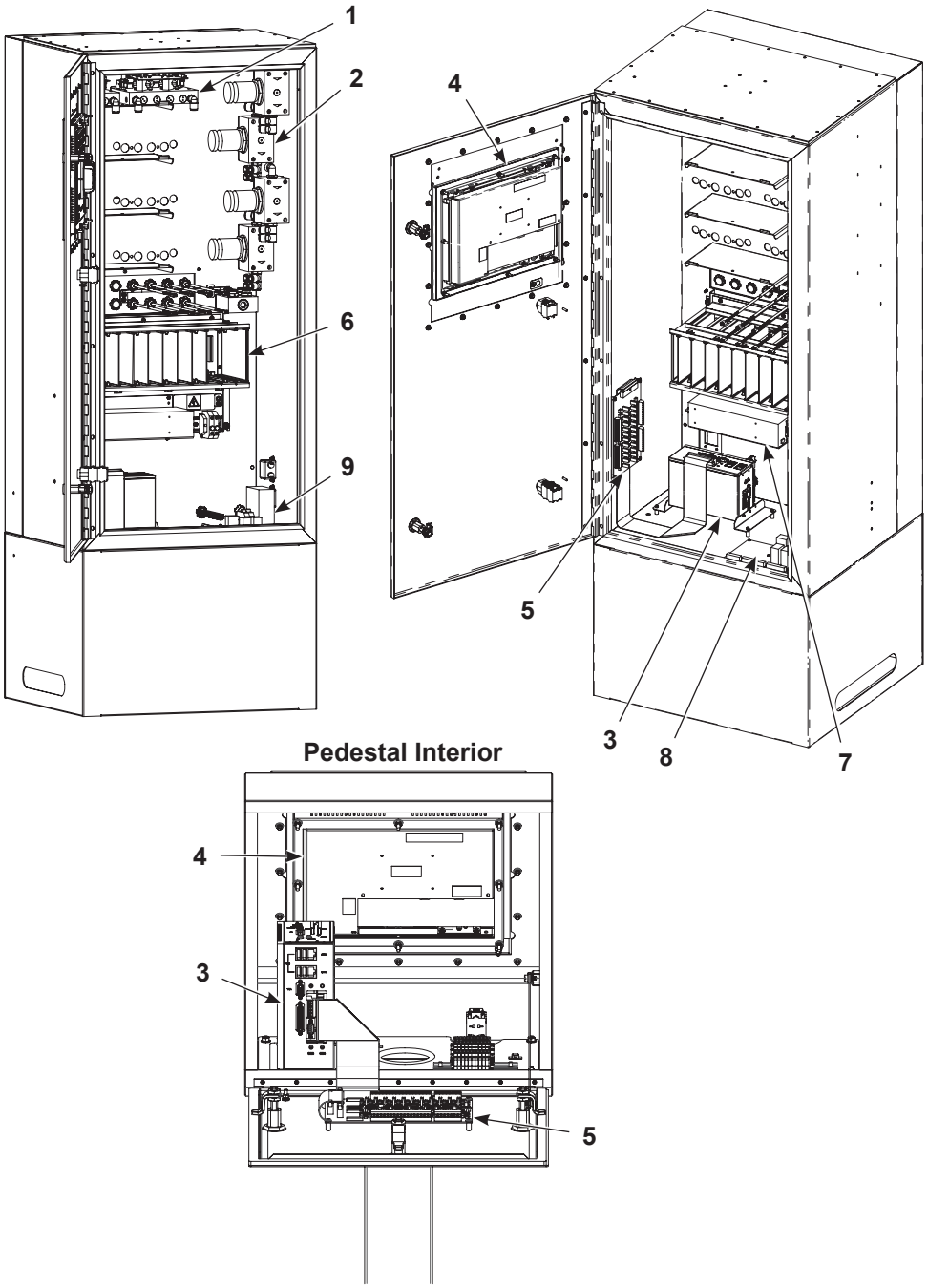


Figure 2-2 iControl 2 Main Console and Pedestal Internal Components

1. iFlow digital airflow modules
2. Regulators
3. PC
4. Touch screen display
5. I/O board
6. Dual gun cards, card cage, and backplane
7. Power supply − multiple output
8. Relay board
9. 24Vdc power supply

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Operator Interface

The operator performs all configuration and operation tasks with the touch screen and iControl 2 software. The software provides the operator a graphical user interface for system configuration, operation, and troubleshooting.

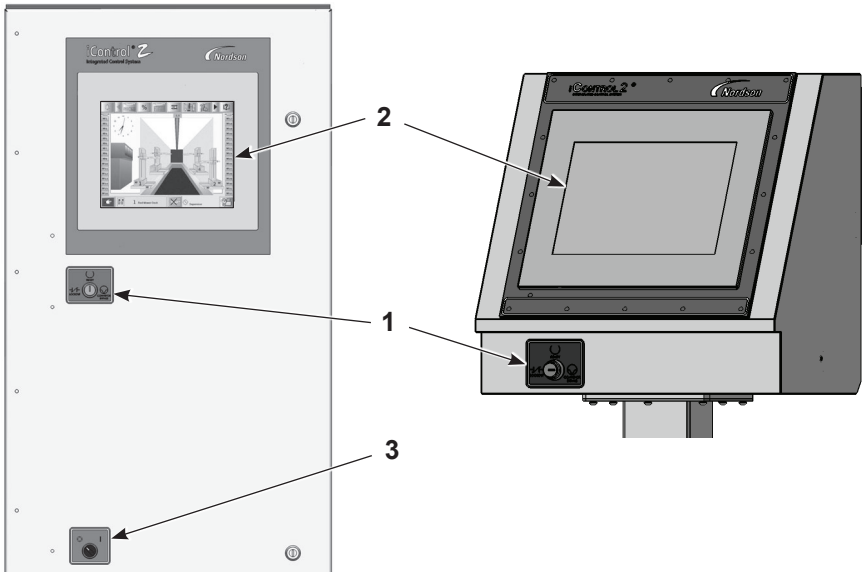


Figure 2-3 Main Console and Pedestal Front Panels

1. Interlock keyswitch
2. LCD touch screen
3. Power switch

NOTE: The operator interface software and operating system should be completely shut down before turning off console power.

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.

DC Power Supplies

There are two power supplies in the console, a 400 watt, multiple output power supply and a 120 watt, 24Vdc power supply. The 400 watt power supply provides power to the iFlow modules and the dual gun cards. The 120 watt power supply provides 24Vdc power to the PC and relay board. The relay board converts 24Vdc to 12Vdc for the display.

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Dual Gun Cards

Each dual gun card in the card cage provides electrostatic controls for two Encore automatic powder spray guns. The cards provide a 0−20 VAC (peak) signal to drive the electrostatic power supplies inside the Encore spray guns. The dual gun card also provides process feedback to the operator interface.

iFlow Digital Flow Modules

The iControl 2 system controls air flow to the pumps supplying powder to the automatic spray guns. The flow controls consist of the precision regulators and iFlow digital flow modules.

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

The modules provide closed-loop control of the flow and atomizing air, 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 iFlow modules so the closed-loop controls 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 m3/hr (8 scfm). Each channel (flow or atomizing air) has a maximum output of 6.8 m3/hr (4 scfm).

Two solenoid valves on the iFlow modules control the flow of gun 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 to provide a continuous flow.

Communication between the iFlow modules and the iControl 2 PC is through the internal CAN network.

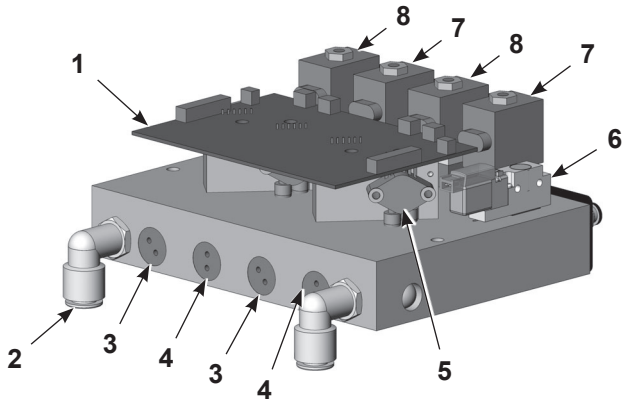


Figure 2-4 iFlow Digital Flow Module Components

1. Circuit board
2. Air input fittings
3. Atomizing air orifice
4. Flow air orifice
5. Flow sensor (part of circuit board)
6. Solenoid valves (gun air)
7. Flow air proportional valve
8. Atomizing air proportional valve

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Internal and External Networks

The iControl 2 system uses both a CAN network for internal communications and an Ethernet network for external communications.

CAN Network: Handles communications between the gun control cards, iFlow modules, and the iControl 2 PC. The CAN network is also used to communicate with the gun control cards and iFlow modules in auxiliary consoles. If two booths are on the same line, the CAN network can also communicate with auxiliary consoles controlling the 2nd booth guns.

Ethernet Network: Handles communications between the iControl 2 system, the main electrical control panel, and the Part ID panel(s).

Digital Inputs

The iControl 2 system includes an I/O board that provides optically isolated digital inputs. Included are:

- eight discrete (digital) inputs for zone detection (gun triggering).
- eight discrete (digital) inputs for part identification (recipe select).
- one input for a conveyor encoder (encoder A).
- one input each for trigger bank 0, trigger bank 1, and trigger select.

The above inputs are used to track parts through the powder coating system, select the desired recipe for the part, and trigger on and off the appropriate spray guns when the parts reach the desired trigger points.

All the digital inputs are routed through a part ID junction box on the part ID stand. A 24Vdc power supply in the junction box provides power for the photoeyes and scanners. A second junction box may be used depending on the number and type of scanners in the system.

A cable connects the part ID junction box to the iControl 2 main console or pedestal. The cable plugs into the PD1 connector on the console or pedestal, then is field-wired to the terminal block in the part ID junction box.

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Conveyor 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 2 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 internal clock or an external timer may be used instead of an encoder. Consult with your Nordson representative.

Part ID Interface Controller

The system may include a Nordson Part Identification (Part ID) interface system. This module is located in a remote junction box and is used to interface the iControl to light curtains. Refer to the *Networked Plug-and-Play Part ID System* manual for more information.

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Specifications

General

See Figure 2-8 and Figure 2-9 for pedestal and console dimensions.

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 m3/hr (8 scfm)
Maximum output per channel	6.8 m3/hr (4 scfm) (flow-rate, atomizing)
Gun air (electrode wash)	0.36 m3/hr (0.2 scfm)
Electrical Requirements	
Input	Unswitched: (PC) 100−230 Vac, 50/60 Hz, 1 ∅, 100 VA max.
	Switched: 100−230 Vac, 50−60 Hz, 1 ∅, 250VA max.
	Conveyor Interlock, 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)	± 19V, ±1A (peak)
Output (to pedestal)	+24Vdc, +12Vdc
NOTE: The iControl 2 system must be interlocked with the fire detection system so that the spray gunsare 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	+15° C to +40° C
Operating Humidity	5−95%, non-condensing
Hazardous Location Rating (See Note)	Class II Division 2, Groups F & G Zone 22 area.
NOTE: Only the iControl 2 Pedestal is certified for hazardous locations or zones. The Main and Auxiliary Consoles must always be located outside the hazardous area or zone.	

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Air Quality

The air supply 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 pre-filters 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/ft³

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.

Special Conditions for Safe Use

The Encore Automatic Powder Spray Applicators shall only be used with the associated Encore iControl 2 integrated controllers over the ambient temperature range of + 15 °C to + 40 °C.

Only the iControl 2 Pedestal is certified for hazardous locations or zones. The Main and Auxiliary Consoles must always be located outside the hazardous area or zone.

Caution should be taken when cleaning plastic surfaces of the iControl 2 pedestal or console. There is a potential for static electricity build up on these components.

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Approval Labels

The following figures show the content of the approvals labels on the system cabinets.

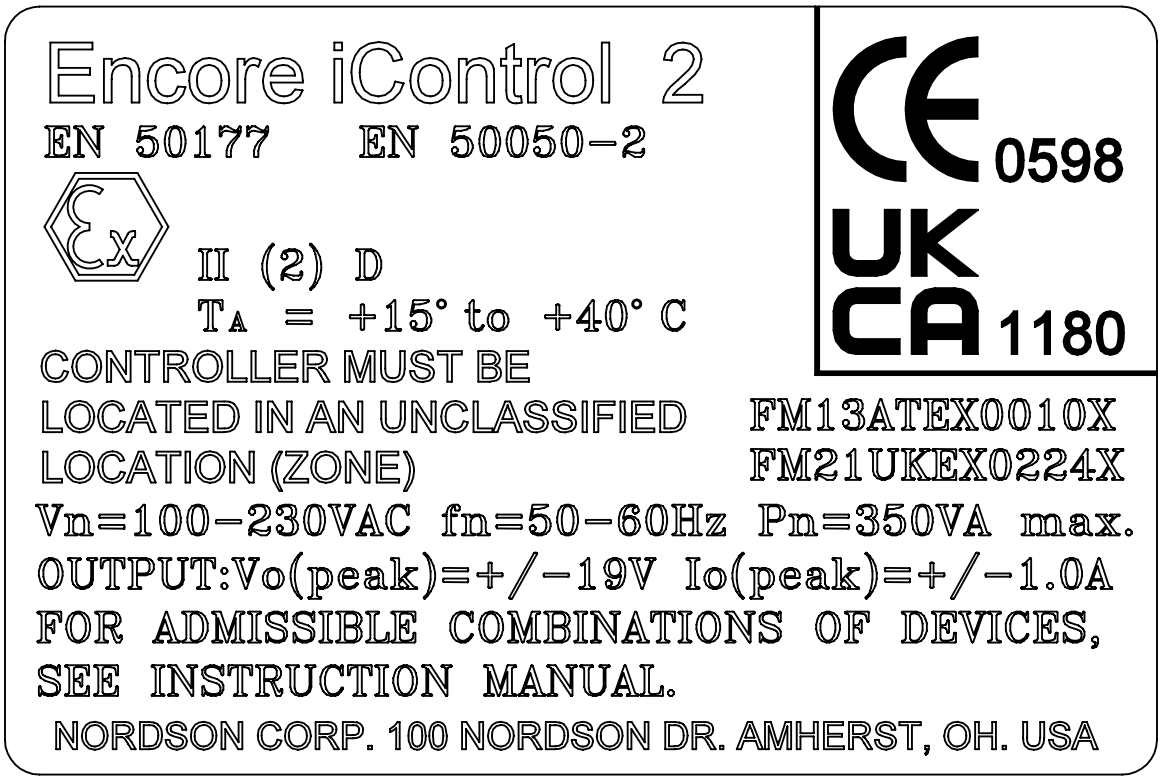
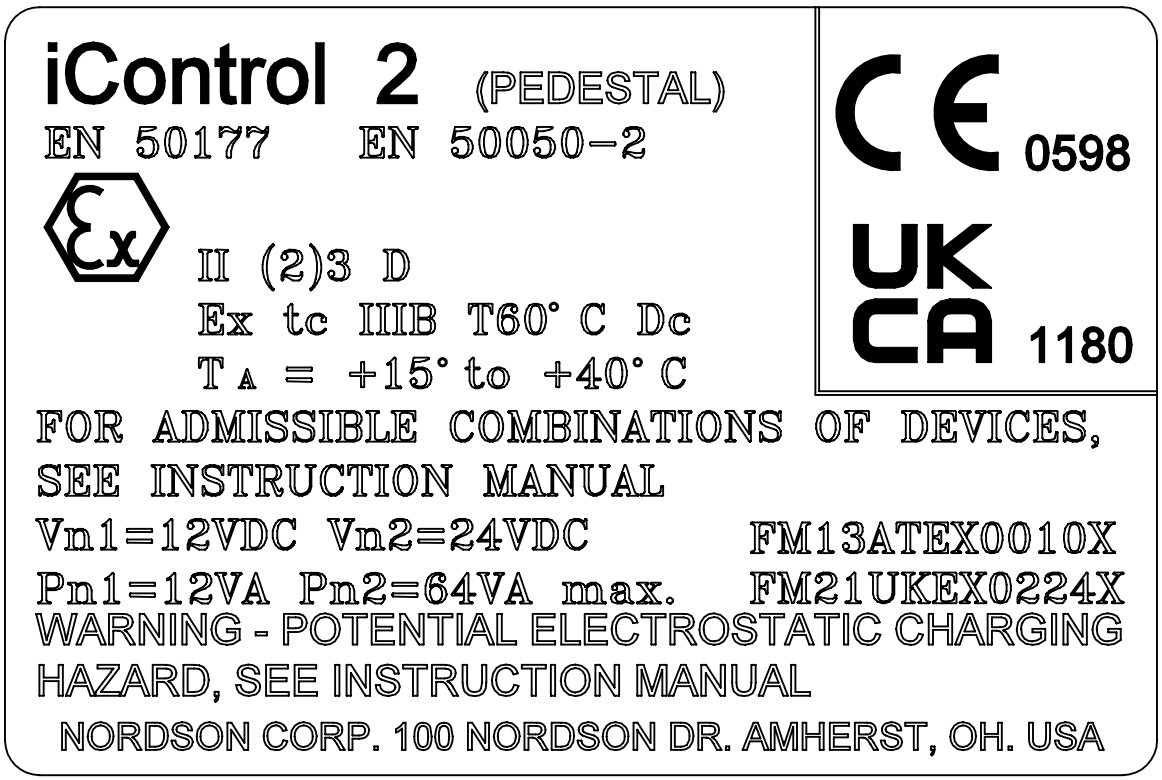


Figure 2-5 Label for EX Approval (On Main and Auxiliary Cabinets)

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1603230

Figure 2-6 Label for EX Approval (On Pedestal Cabinet)



1603231

Figure 2-7 Label for FM Approval US and Canada (On Main, Auxiliary, and Pedestal Cabinets)

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Pedestal Dimensions

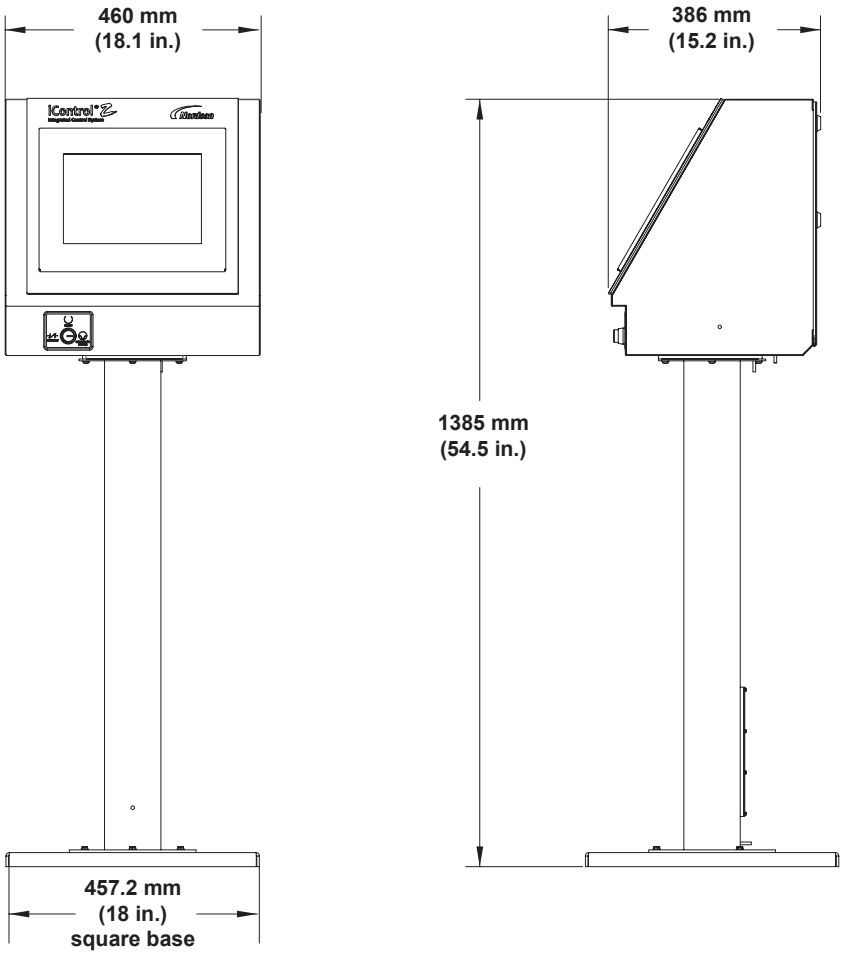


Figure 2-8 Pedestal Dimensions

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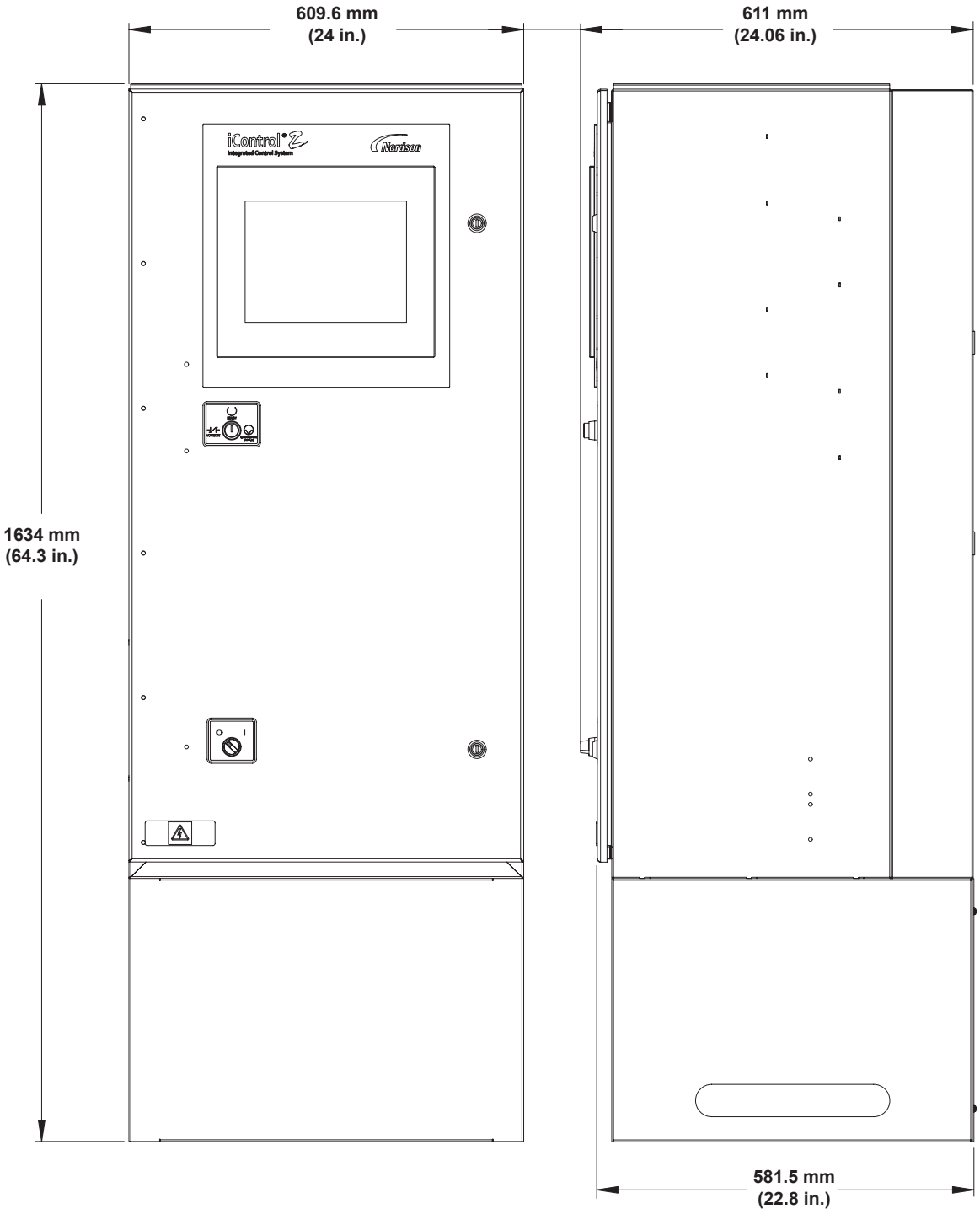


Figure 2-9 Console Dimensions

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Approved Program and User Data Cards

CompactFlash card capacity: 512 Mb minimum − Type I CompactFlash only.

NOTE: Retail type CompactFlash modules are not recommended, since they can cause a system boot failure.

Retail CompactFlash refers to devices available at camera, computer, and electronic retail shops. Retail flash has a rating of 30,000 to 600,000 write cycles at a maximum of 75°C (167°F) and may experience a shorter overall life.

Industrial CompactFlash refers to rated devices only available through an electronics parts supplier and online sources that sell CompactFlash with an industrial temperature rating for use in Embedded Systems. Industrial flash has a rating of 2,000,000 write cycles and an increased temperature range to 85°C (185°F).

NOTE: Both the Program and Data cards should be the same size and from the same manufacturer. If they are not of the same size, the system may not boot properly.

NOTE: The SwissBit 2 Gb is the only validated card for Rev 2 Arbor PC, which requires a minimum of a 2 Gb CompactFlash.

Validated cards:

- Dane−Elec − retail to 512 Mb
- Kingston Technology − retail to 4 Gb
- PNY − retail to 2 Gb
- SanDisk − retail to 2 Gb, industrial to 1 Gb
- SanDisk − industrial 4 Gb or larger (must be used in pairs)
- Silicon Systems − industrial 512 Mb
- Smart Modular Technologies − industrial to 1 Gb
- SMC Numonyx − industrial to 1 Gb
- SwissBit − industrial 2 Gb
- Transcend − industrial 512 Mb
- Toshiba − retail to 2 Gb

Incompatible Cards:

- LEXAR − any
- Type II Compact Flash − any (cards will not fit in card slot)
- SanDisk retail 1 Gb and above

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Section 1

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 2 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.

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

WARNING: Use dust-tight conduit connectors or strain reliefs rated IP6x in all iControl 2 console, pedestal, junction box, and electrical panel knockouts. Installation must be done according to code and care must be taken to maintain the dust-tight integrity of the enclosures.

NOTE: Only the pedestal can be installed inside the hazardous zone. The main and auxiliary consoles must installed outside the zone.

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System Connections

Connection Diagrams

See Figure 3-1. The main console, auxiliary console, pedestal, part ID junction box, and system electrical panel are fitted with receptacles for interconnect cable connections.

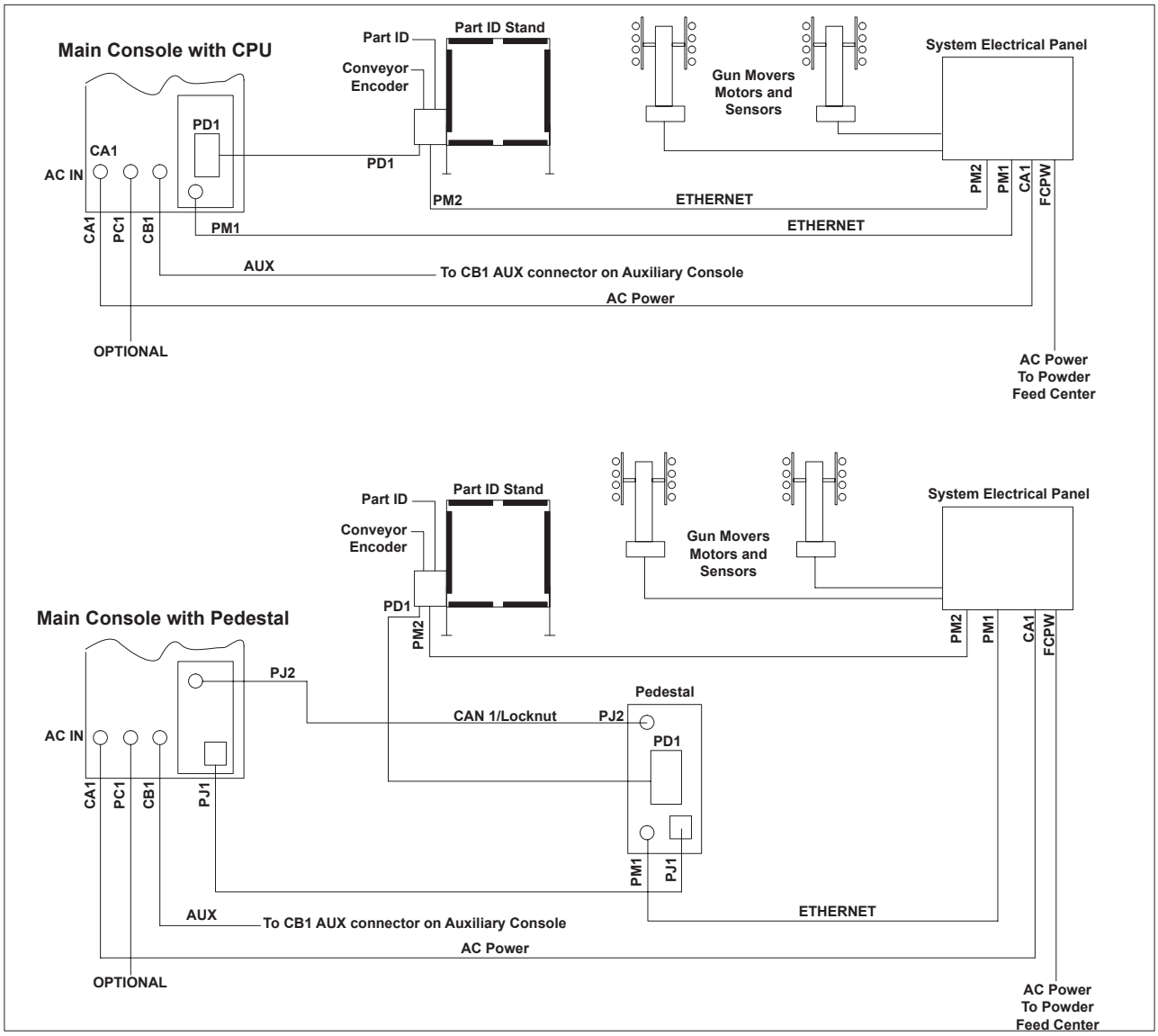


Figure 1-1 System Interconnect Cable Connections

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Interconnect Cables

Refer to the *Parts* section for cable part numbers.

Table 1-1 System Interconnect Cables

Cable	Function
PD1	Discrete signals for zones 1−8, part ID 1−8, trigger banks 1 and 2, trigger select, conveyor encoder A, plus +24Vdc to power the scanner controllers or photocells.
CB1	CAN network gun trigger, electrostatics, and powder flow signals to guns 17−32 in the auxiliary console.
PM1	Ethernet signals for gun mover control and for powder feed center color change sequence.
PM2	Ethernet signals from analog scanners for gun mover control.
PJ1	Signals between pedestal and console: • +12 and +24V to pedestal • Conveyor run • Remote lockout • Gun power OK • Keyswitch lockout • Keyswitch bypass • Remote manual enable • Alarm
PJ2	CAN network and lockout signals between pedestal and console.
CA1	AC power from the system electrical panel.
CB1	CAN network to guns 17−32 in auxiliary console
PC1	Optional connection for remote signals for the following functions: • Manual enable • Remote lockout • Alarm relay

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CAN Network Address and Termination Settings

See Figure 3-2.

The CAN network terminator switch and console address switches on the backplane must be set properly before powering up the system.

Network terminator switch:

- main console only: Set the network terminator to END (SW1−3 closed)
- main and auxiliary console: Set the main console to CONTINUOUS (SW1−3 open) and the auxiliary console to END (SW1−3 closed).

Network address switch:

- Set the main console to 1 (SW1−1 closed, SW1−2 closed).
- Set the auxiliary console to 2 (SW1−1 closed, SW1−2 open).

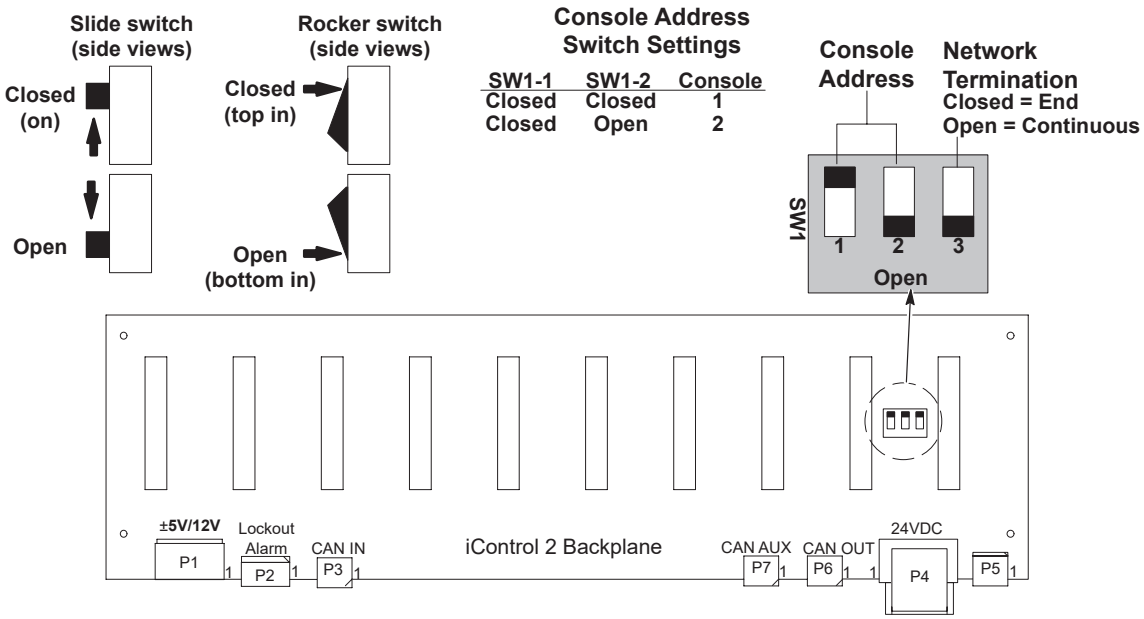


Figure 1-2 CAN Network Connections, Console Addresses, and Termination

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iFlow Module Switch Settings

The switches on the iFlow digital flow modules set the:

- gun air flow triggering
- console address
- module address

Each iFlow module must have a unique network address. The system cannot operate flow modules with duplicate addresses. It notifies 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 3-2.

Gun Air Wash Control (SW4−1, 2)

Set switches 1 and 2 to Continuous (down) air flow or to Triggered (up) air flow.

SW4−1 corresponds to the gun of Channel 1 and SW4−2 corresponds to the gun of Channel 2 of the iFlow module. .

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 Address (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 1-2 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 (main)
Up	Up	Trigger	Up	Down	2 (auxiliary)

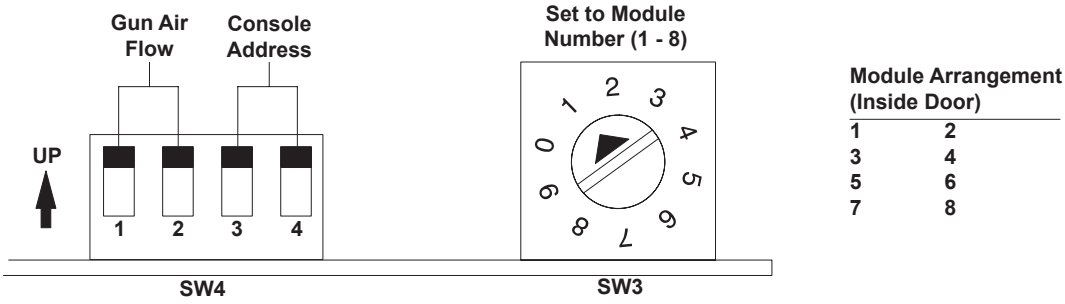


Figure 1-3 iFlow Module Address

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Power Connections

The console power cable plugs into the AC IN receptacle on the rear of the console. The cable is routed to the system electrical panel and connected to a terminal block.

CAUTION: The 120 watt 24Vdc power supply mounted on the DIN rail at the bottom of the console is not autosensing. It is set at the factory for 230V. If you are supplying 110V to the iControl 2 console, you must switch the power supply to 110V. If you switch from 110V to 230V in the future, you MUST switch the power supply to 230V before connecting power to the console.

Table 3-3 lists the connections required for both main and auxiliary consoles.

Console Power Cable Connections

Table 1-3 Console Power Cable Connections

Main Console Power Cable Connections		
Wire Color	**Pin**	**Function**
Whit/Blk	1	Conveyor run AC common
Black	2	Non-interlocked AC
White	3	Non-interlocked AC common
Red	4	Interlocked AC
Orange	5	Conveyor run AC
Blue	6	Interlocked AC common
Green	7	Ground
Auxiliary Console Power Cable Connections		
Wire Color	**Pin**	**Connection**
Black	2	Interlocked AC (same as main console Red connection)
White	3	Interlocked AC common (same as main console Blue connection)
Green	1	GND

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Interface Relays

The system is pre-installed with 240 Vac interface relays. If the required voltage is 120 Vac, the relay must be replaced with the applicable relay included with the system.

The replacement kit contains the following:

- Two relays, 1FRMC, 240 V coil, GSRS (installed) − 1093008
- Two relays, 1FRMC, 120 V coil, GSRS (shipped with) − 1081529

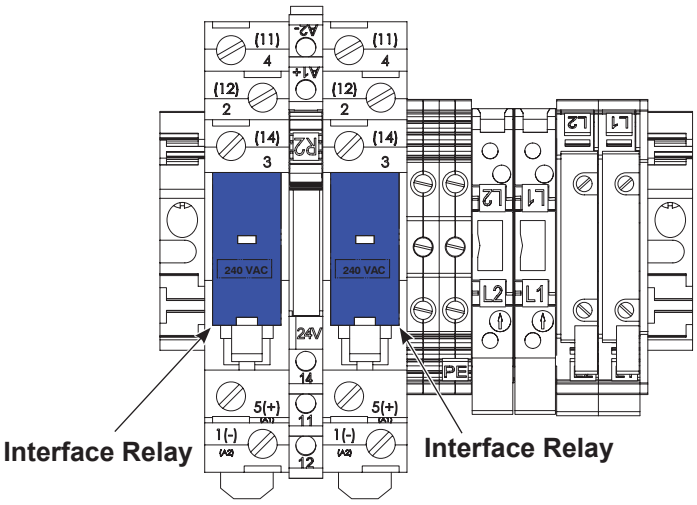


Figure 1-4 Terminal Block

Replacing Relays

NOTE: Be sure to replace both relays.

1. Turn the circuit power OFF.
2. Press the relay tab to remove the installed relay.
3. Replace with the applicable voltage relay.

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Grounding

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 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.

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 sole purpose of the green/yellow ground wires bundled with the AC input power cable are to protect personnel from a shock. They must be used for PE grounding only. These ground wires do not protect equipment 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.

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Gun Current Path

Refer to Figure 3-5. All electrical circuits need a complete path for current to make its way back to the source. 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, which can cause damage to the controller electronics (gun driver board and power supply).

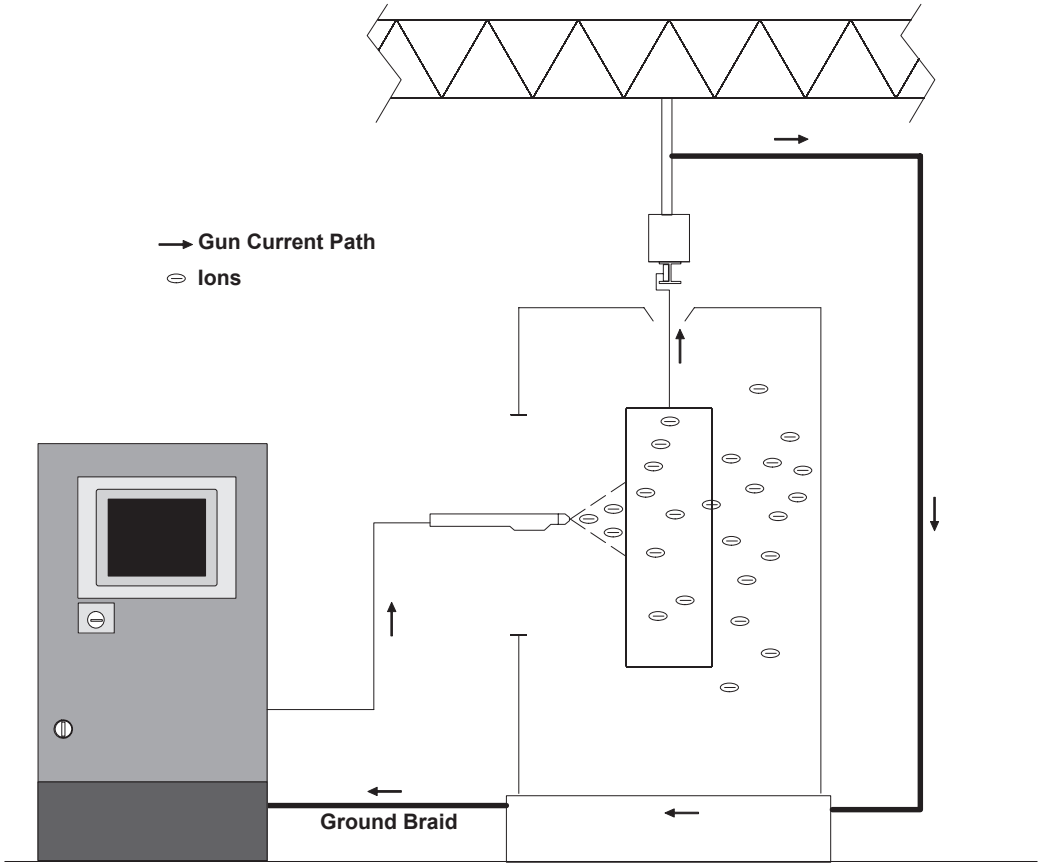


Figure 1-5 Electrostatic Current Path

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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.

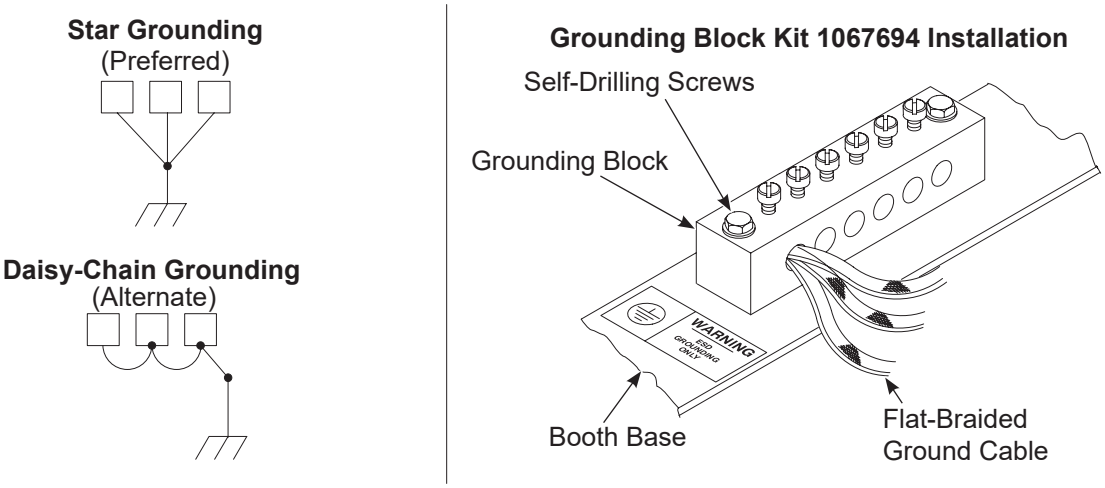


Figure 1-6 ESD Grounding Procedures and Equipment

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 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 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

The PD1 cable carries the encoder, discrete part ID and zone input, trigger bank1 and 2, and trigger select signals from the Photoeye Junction Box (PEJB) to the I/O board in the iControl 2 console or pedestal. If these inputs are shared by a second booth then an additional cable is supplied.

Table 3-4 lists the PD1 cable connections to be made at the terminal strip in the junction box. Refer to the drawings at the back of this manual for the terminal block connections.

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

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Part ID Cable Connections

The PD1 cable plugs into the receptacle on the back of the console or bottom of the pedestal. Use a liquid-tight cord grip to bring the cable into the Photoeye Junction Box (PEJB).

Connect the cable to the terminal block in the PEJB, using Table 3-4.

Table 1-4 Part ID Cable PD1 Pinouts, Wire Colors, and Functions

Pin Number	Wire Color	Function
1	Black	Zone 1
2	Brown	Zone 2
3	Red	Zone 3
4	Orange	Zone 4
5	Yellow	Zone 5
6	Green	Zone 6
7	Blue	Zone 7
8	Violet	Zone 8
9	Gray	Part ID bit 1
10	White	Part ID bit 2
11	White/Black	Part ID bit 3
12	White/Brown	Part ID bit 4
13	White/Red	Part ID bit 5
14	White/Orange	Part ID bit 6
15	White/Yellow	Part ID bit 7
16	White/Green	Part ID bit 8
17	White/Blue	Trigger Bank 0
18	White/Violet	Trigger Bank 1
19	White/Gray	Trigger Select
20	White/Black/Brown	Encoder A
21	White/Black/Orange	spare
22	White/Black/Yellow	spare
23	White/Black/Green	spare
24	White/Black/Red	+24 Vdc
N/C	White/Black/Blue	−−

Using Trigger Banks

For information on how to use Trigger Banks, see *Using Zone Inputs for Direct Triggering* in the iControl 2 Software Manual. The customer must bring additional wiring into the junction box and wire them to terminals 17, 18, and 19. Note that the factory default configuration for these inputs is sinking. If a sourcing configuration is required refer to *Switching Inputs to Sourcing* on the following page.

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Switching I/O Inputs to Sourcing

Inputs to I/O card 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.

Photoeye Junction Box

The Photoeye Junction Box houses a 24Vdc power supply, terminal block, and scanner controllers. The box is typically mounted on the legs of the part ID stand. The part ID cable and the encoder, conveyor interlock, and photoeyes or discrete scanner controllers are wired directly to the terminal block as shown in the junction box drawing.

Power Requirements

The junction box contains a 30 watt, 24−28 Vdc power supply. It requires 120−240 Vac, 1 PH, 50/60 Hz, 2A.

Conveyor Encoder Connections

Bring the encoder cable into the junction box through a cord grip at one of the unused knockouts. Wire the cable to the encoder and the junction box terminal strip as shown on the junction box drawing in Section 7.

Photoeye Connections

Connect SO cable to the photoeyes and junction box terminal block as shown on the drawing. Route the cables into the junction box through dust-tight cord grips.

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Scanner Cable Connections

Configurations for part identification (part ID) may vary. This section contains information regarding both configuration available.

Nordson Part ID

The Nordson part ID system provides dimensional data about parts to be coated in a spray triggering system. The system detects and transmits part location and shape dimension to the system controller of an automated spray system, allowing for automatic adjustment to the part zone through zone controlling and in/out positioning. Three major assemblies are included in the system:

- Frame (part ID stand)
- Sensors (beam arrays or single beam photo eyes)
- Junction box (includes part ID electronics

The following steps outline the basic system function.

1. The sensor light signals are broken by a part moving on a conveyor line.
2. The junction box uses inputs from the sensors to decode the shape and location of the parts to be coated and transmits data to the system controls. The junction box can also be configured to monitor the line continuously and to read part ID flags.
3. An iControl (or similar system controls) with a conveyor encoder uses information from the junction box to direct the location and state of the spray guns ensuring the part is properly coated.

The Nordson part ID controller accommodates the connection of up to two horizontal light curtains, up to two vertical light curtains, and a single flag light curtain. The vertical light curtains can provide both height and zone information using a single light curtain unit.

For more information, refer to the Networked Plug-and-Play Part ID System manual.

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Scanner Cable Connections (contd)

Banner® Beam Array Controllers

NOTE: This section covers the interfacing to Banner® A-Gage® Mini-Array® components using MAC series controllers.

See Figure 3-7. 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 2 system receives the part ID before the leading edge of the part breaks the zone scanners or photoeyes.

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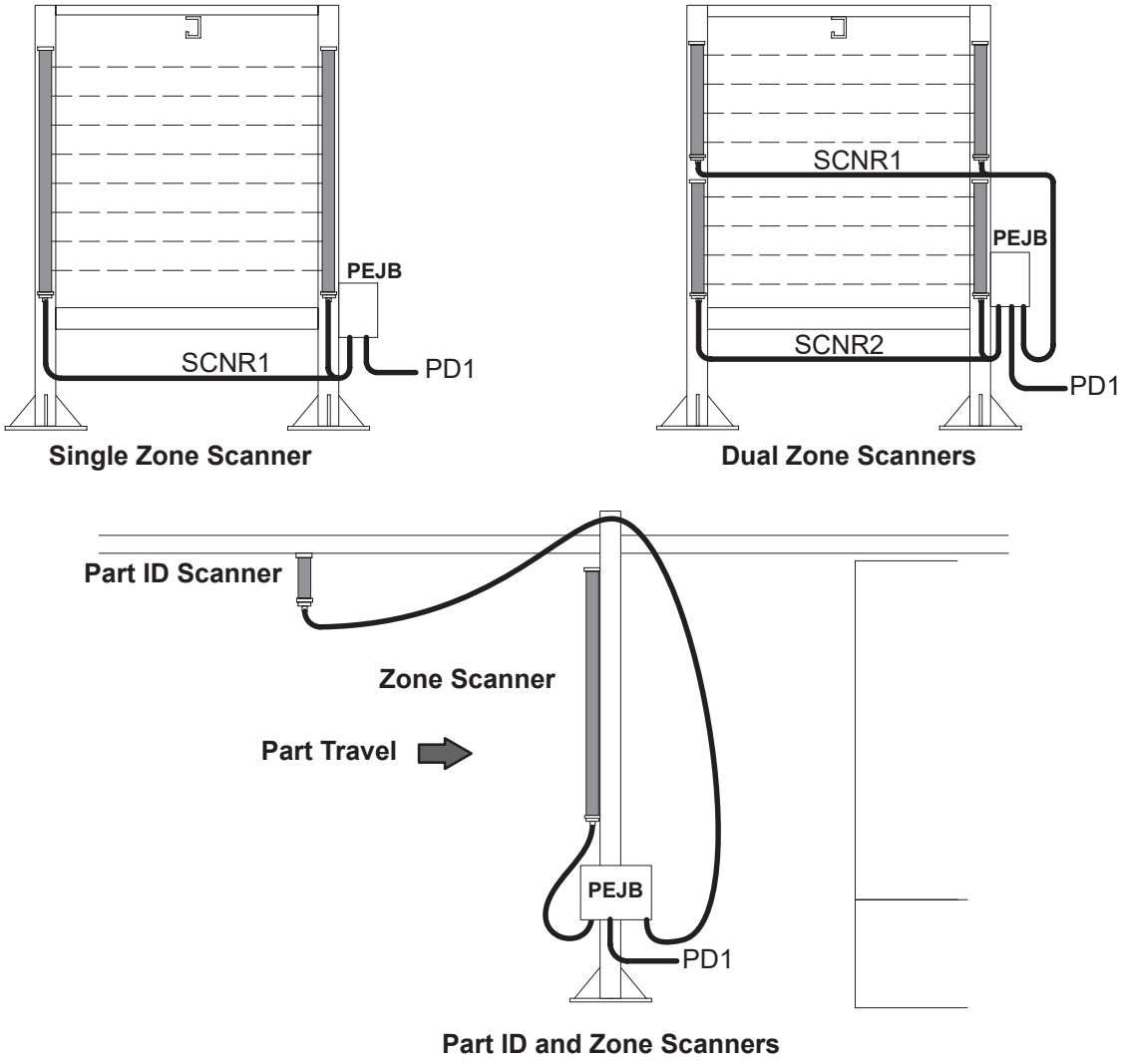


Figure 1-7 Zone and Part ID Scanner Cable Connections (Typical)

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Scanner Cable Connections (contd)

Analog Scanner Connections

See Figure 3-8. If the system includes in/out positioners or reciprocators, then an analog scanner junction box is added to the part ID stand to house the analog scanner controllers. The controllers are powered by the 24Vdc power supply in the PEJB.

The analog scanners are mounted on the stand to detect the part width for positioners, and height for reciprocators. The scanners must be mounted with the cable ends oriented as shown. Connect the scanner cables (BSCE, BSCR, SCNR1) from the junction box to the scanners as shown.

NOTE: Horizontal dual scanners must be mounted so that they do not see the conveyor. If using a single horizontal scanner, the scanner controller must be programmed to ignore the conveyor.

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.

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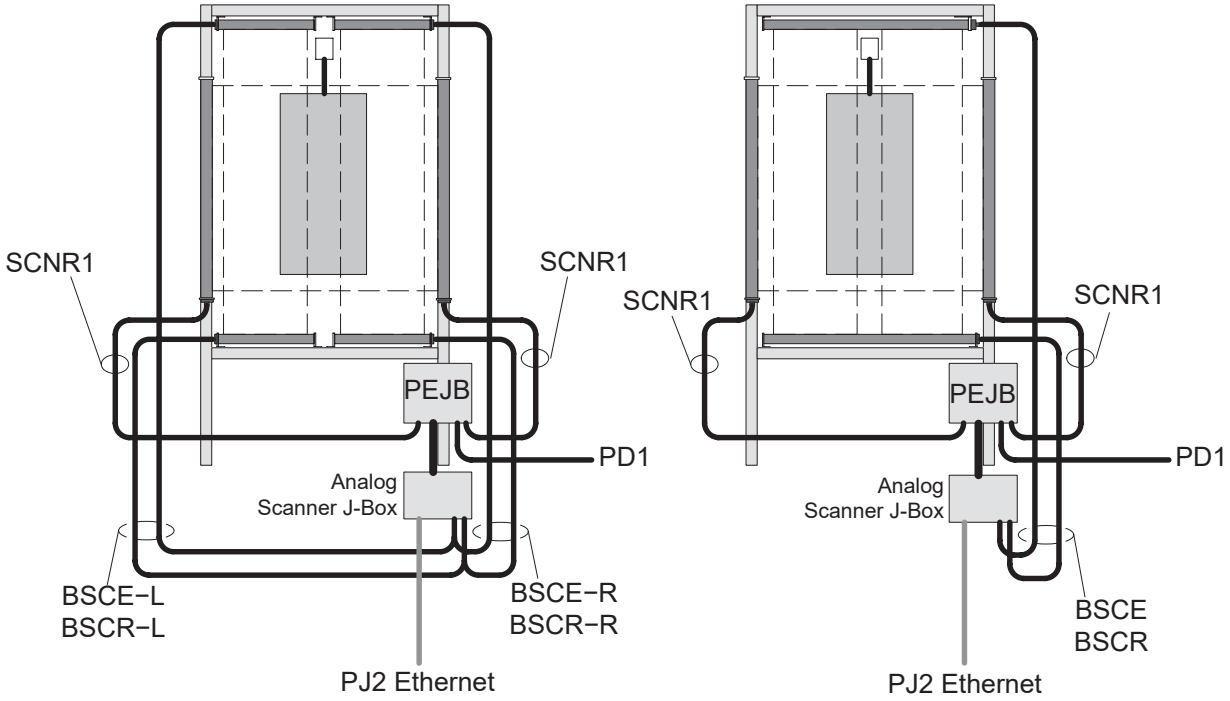


Figure 1-8 System Wiring − In/Out Positioner Scanner Connections

Customer-Supplied Part ID System Connections

Refer to Table 3-4. Use the Part ID terminals on the Photoeye Junction Box to connect a customer-supplied part ID system to the iControl 2 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.

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Ethernet Network Connections

Connection Diagram

The Ethernet network allows the iControl 2 system to communicate with the gun mover PLCs and the analog scanner controllers through a network switch in the Main Electrical Control Panel. The Ethernet cables are M12 D−coded 4 pole cables with connectors on each end.

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

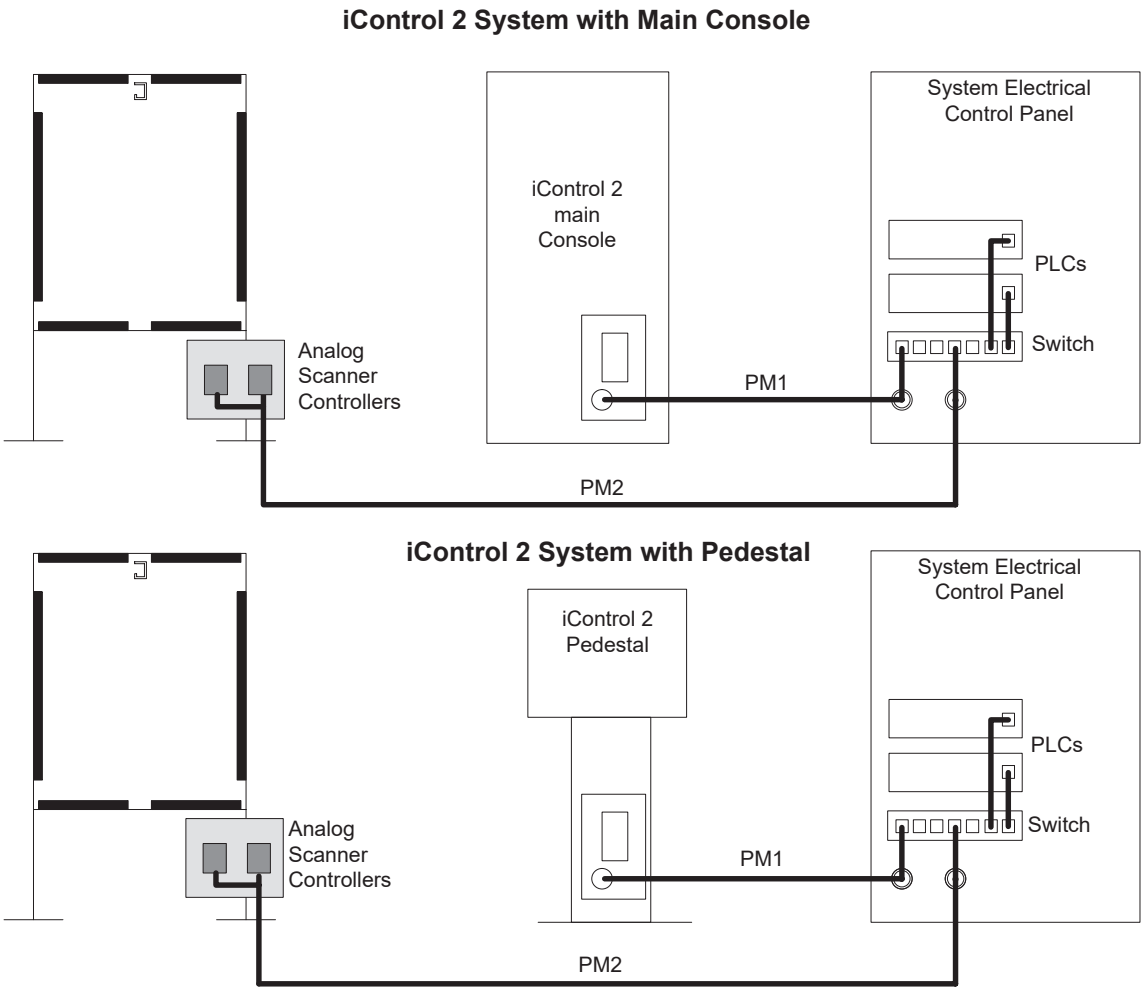


Figure 1-9 Ethernet Connections

MAC Addresses

Record the MAC addresses and functions for each Ethernet node in the analog scanner junction box and main electrical control panel, or any other panels. You will need these when configuring the iControl 2 software.

The MAC addresses are on the node labels, in the form 0:30:DE:0:33:C8. Each PLC node can control two positioners, or a positioner/reciprocator combination, or two reciprocators.

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Gun Cable Connections

See Figure 3-10. Connect the automatic gun cables to the receptacles on the rear panel of the iControl 2 console. Connect gun 1 cable to receptacle 1, gun 2 cable to receptacle 2, and so on.

Odd Number of Guns

iControl 2 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 bulkhead seal and jumper. The jumper disables 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.

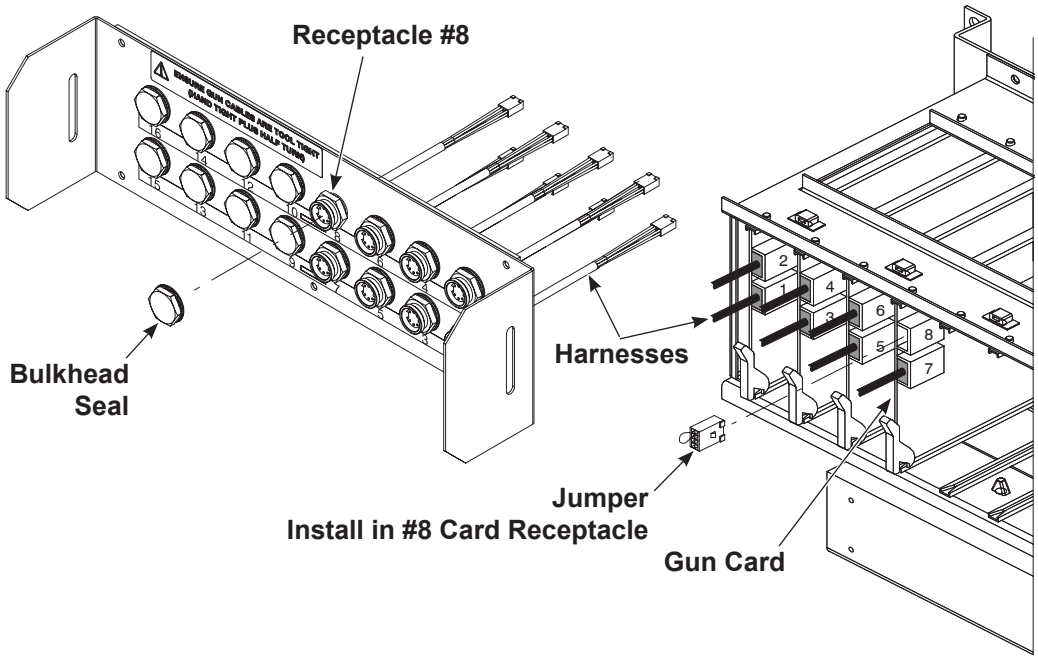


Figure 1-10 Seal and Jumper Installation − Example Showing 8 Gun System Using 7 Guns

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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.

See Figure 3-11. Connect the air supply hose (customer-supplied) to the 3/4 JIC threaded male elbow at the filter mounted on the back of the console. Connect the other end of the hose to your air supply.

NOTE: If supplying air to both a main and auxiliary console, run a separate hose to each console from the system 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 3-11 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.

Connect 4-mm clear air tubing from the gun air (electrode wash) connectors on the console rear door to the spray guns. Verify all the tubing is correctly connected, so that gun 1 is connected to the gun 1 fitting and so on.

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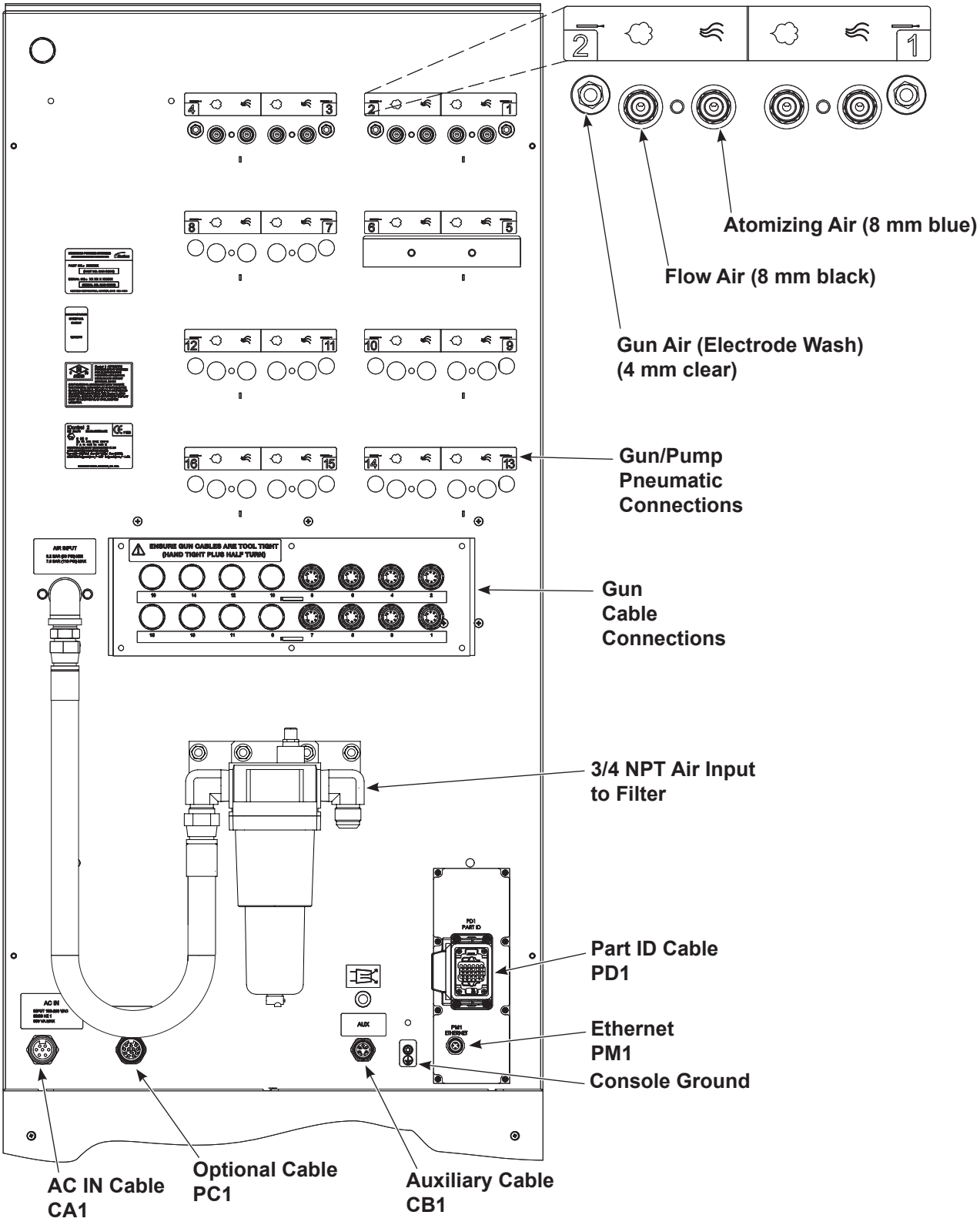


Figure 1-11 Console Rear Panel (Cover Removed)

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Program and User Data Cards

The iControl 2 program and user configuration and preset data are stored on two 128 Mb or larger CompactFlash (CF) cards. These cards function as removable hard drives. The iControl 2 consoles are shipped with these cards installed.

NOTE: The Rev 2 Arbor PC requires a minimum of a 2 Gb CompactFlash.

CAUTION: The CompactFlash cards CANNOT be hot-swapped. Shut down the iControl 2 program and operating system, then turn off the iControl 2 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 2 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 CompactFlash card slots are on the side on the PC. The Program card must be installed in Slot 1, and the Data card is installed in Slot 2.

The iControl 2 program can be updated by installing a new program card.

NOTE: To remove a card, press on the eject button, then pull the card out of the slot.

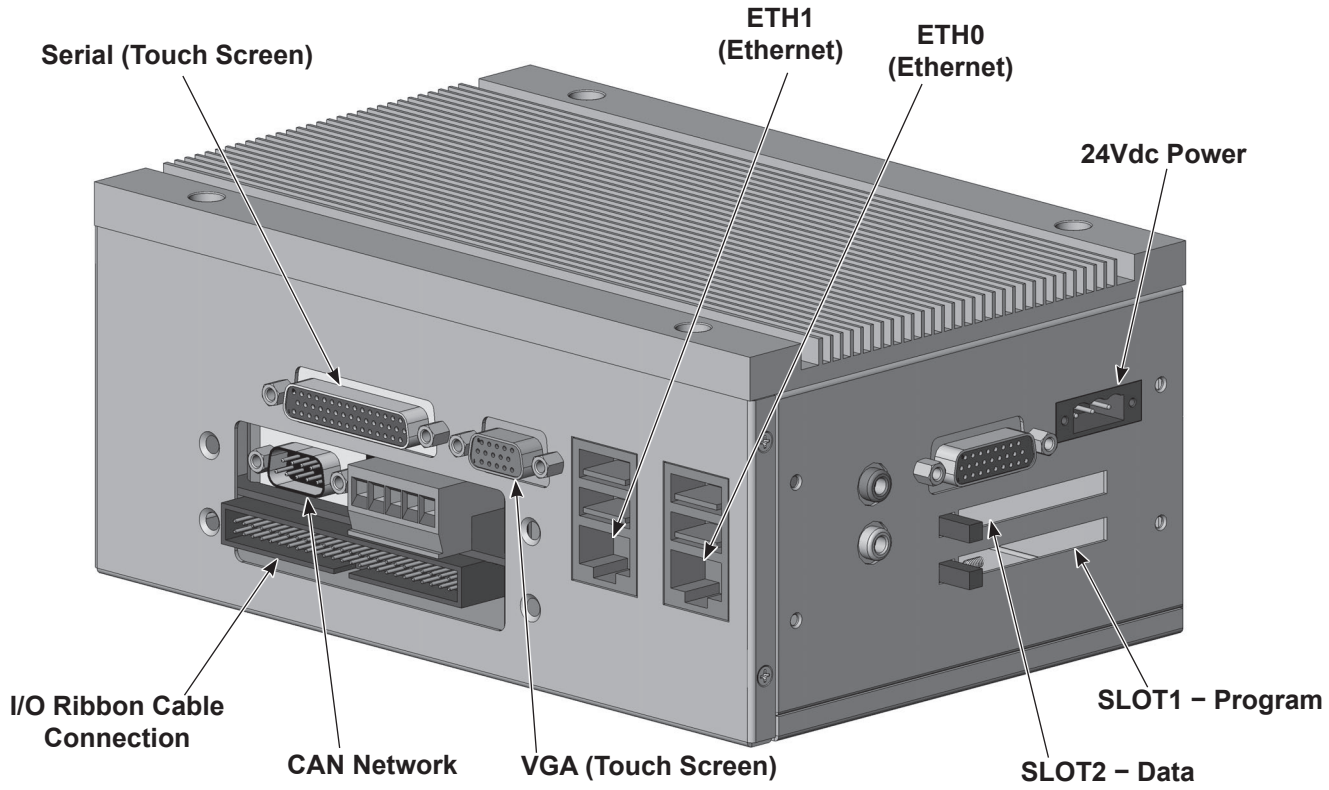


Figure 1-12 iControl 2 Program and User Data Card Slots

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In addition to the configuration data, up to 255 presets per gun can be stored on one data card. Additional cards 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 CF 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 2 button to start the **iControl 2** software.

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

System Upgrades

iControl 2 systems can be upgraded by:

- installing a new program flash card with updated software.
- adding additional guns to an existing console
- adding an auxiliary console
- adding an air conditioner to the console to keep the electronics cool

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

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Optional Air Conditioner Installation and Operation

See Figure 3-13 and Figure 3-14. An optional air conditioner that mounts on top of the console is available for field installation. The air conditioner requires 200−250 Vac, 50/60 Hz. Refer to *Miscellaneous Kits* in Section 6 for the AC kit part number.

WARNING: Shut down the iControl 2 system and disconnect power at a disconnect switch ahead of the console before installing the air conditioner kit.

1. Shut down the iControl 2 system and disconnect power.
2. Open the console door and disconnect the small fan mounted on the top cover from the top left iFlow module by either cutting the wires or removing the plug and pushing the pins out.
3. Disconnect the ground strap from the top cover plate.
4. Remove the top cover plate and gasket from the console. Keep the M5 serrated bolts for re-use.
5. Remove the plug, conduit seal, and conduit nut from the top/right corner of the back wall of the console.
6. Remove the 3/8 NPT plug from the coupling at the bottom inside of the console and install the two barbed fittings into the coupling, one on top and one on the underside.
7. Install the terminal block on the studs located in the upper right inside corner of the console back wall, using the two M5 nuts.
8. Install the new cover plate and gasket on top of the console, using the M5 nuts removed in step 1. The plate can be rotated 180 degrees as desired to change the orientation of the A/C unit. The two slots in the cover plate must match up with the center opening and the two outlet vents in the bottom of the A/C unit.
9. Connect the console ground strap to the closest ground stud on the new cover plate.
10. Install the A/C unit on the new cover plate according to the manufacturer's instructions, using the fasteners provided with the unit.
11. Install the drain kit provided with the air conditioner according to the manufacturer's instructions. Terminate the drain tubing on the upper barbed fitting installed in step 2. Connect tubing (customer-supplied) from the lower barbed fitting to a floor drain.
12. Connect the A/C power cord to the terminal block as shown.
13. Route your AC power cord through a dust-tight cord grip or conduit connector into the console and connect it to the terminal block as shown.
14. Use the wiring harness included in the kit to connect the terminal block relay to the iControl 2 400W power supply as shown. This prevents the A/C unit from running unless the iControl 2 console is turned on.

Filter: To clean the AC unit intake filter, remove the screw from the grille and slide the grille up.

Thermostat: The digital readout on the front of the unit, below the grille, displays the internal temperature. To access the thermostat, remove the grille and filter.

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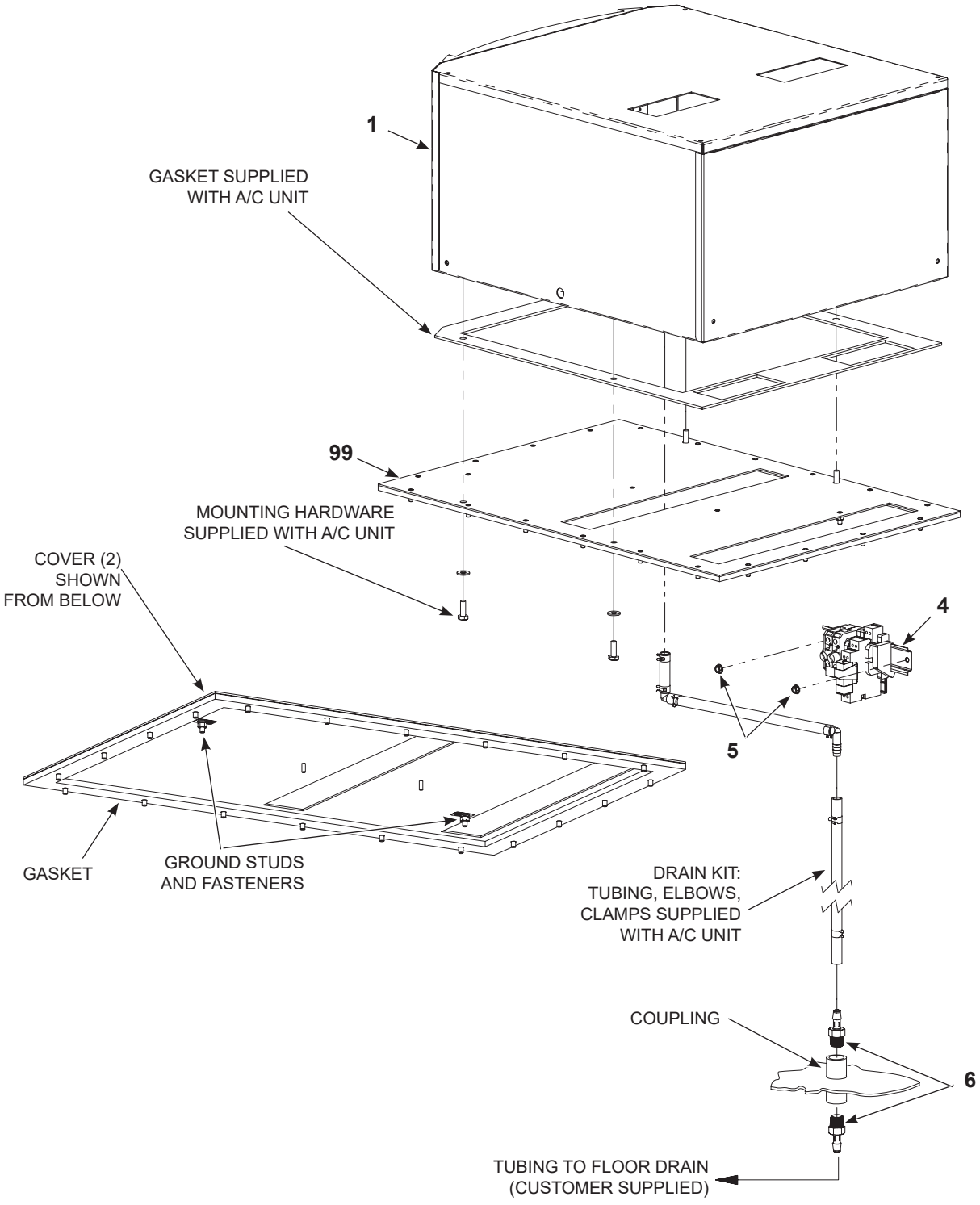


Figure 1-13 Optional Air Conditioner Mechanical Installation

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Optional Air Conditioner Installation and Operation (contd)

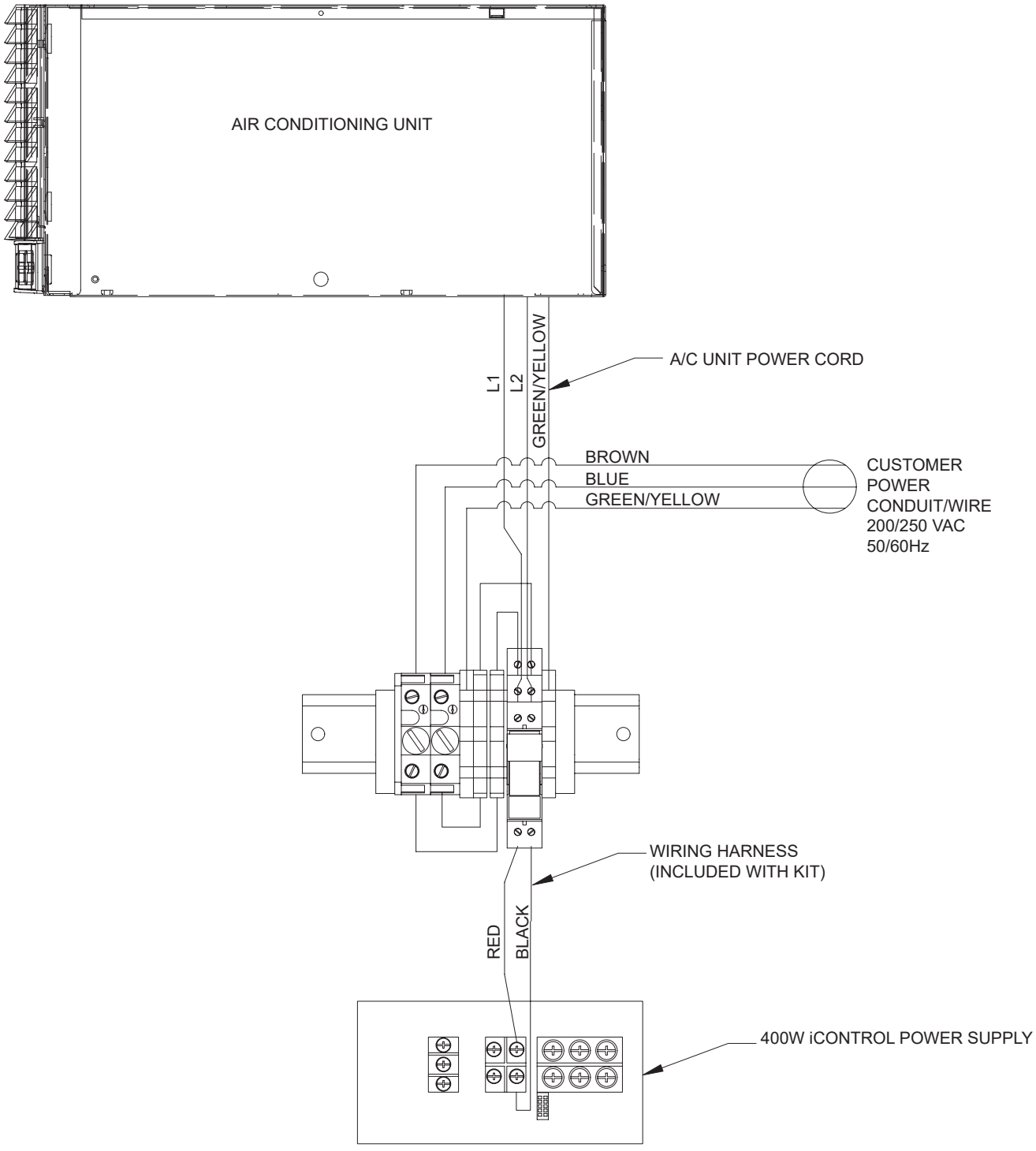


Figure 1-14 Optional Air Conditioner Electrical Wiring Diagram

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Section 1

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 2 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 Industrial Coating Systems Customer Support Center at (800) 433−9319 or your local Nordson representative.

Error Codes and Alarm Messages

Table 1-1 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	page 4-7
102	CAN receive buffer overflow	Host CAN interface receive too much data and could not process it quickly enough	page 4-6page 4-7
103	Message timeout	Remote CAN device did not respond to a direct response in the allotted time.	page 4-6page 4-7
104	Went offline	Remote CAN device is no longer online	page 4-6page 4-7
105	Returned to online	Remote CAN device returned to service	page 4-7
106	Communication error	Host CAN interface detected a communication error	
107	BUS−OFF	255 bad CAN messages received	

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Code	Message Text	Description	Refer to Page
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...
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	Micro-amp value out of range.	page 4-8
302	Over-current fault detected	Over-current detection.	page 4-8
303	Feedback fault detected	No micro-amp feedback detected.	page 4-8
304	Open circuit detected	No multiplier load detected.	page 4-8
305	Short circuit detected	Multiplier drive circuit shorted.	page 4-8
306	Internal hardware fault detected	Internal DSP fault.	4-9
308	Gun not detected	Gun not connected to system.	4-9
40x	**iFlow Controller**		

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Code	Message Text	Description	Refer to Page
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...
5xx	**Remote Device Node**		
Electrostatic Node (Gun Card)			
531	System Heartbeat lost	Gun card lost heartbeat message.	4-9
532	5/24 Volt power	Gun card power detection failure.	4-9
533	Error writing to internal EEPROM	Error saving data to gun card on-board EEPROM.	4-9
534	Error reading from internal EEPROM	Error reading data from gun card on-board EEPROM.	4-9
535	Node address changed from last power-up	The saved address does not match the current address for the gun card. 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 gun card was out of range.	4-9
538	Trigger ON message received − controller in lockout	Gun card was commanded to trigger while in lockout.	4-9
iFlow Node			
541	System Heartbeat lost	iFlow module lost heartbeat message.	4-14
542	5/24 Volt power	iFlow module power detection failure.	4-14
543	Error writing to internal EEPROM	Error saving data to iFlow module on-board EEPROM.	4-14

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Code	Message Text	Description	Refer to Page
544	Error reading from internal EEPROM	Error reading data from iFlow module on-board EEPROM.	4-14
545	Node address changed from last power-up	The saved address does not match the current address for the iFlow module. 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 iFlow module was out of range.	4-14
548	Trigger ON message received − controller in lockout	iFlow module was commanded to trigger while in lockout.	4-14
			Continued...
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

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Code	Message Text	Description	Refer to Page
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...
100x, 110x	**Positioner**		
1001	E-Stop OPEN	The E-Stop circuit is open.	4-17
1002	Encoder failure	The encoder is not responding when motion is commanded or is responding with defective signals.	4-17
1003	Motor Protector	The motor protector is open.	4-18
1004	Motion Controller	The motion controller indicates a failure.	4-18
1005	Forward Contactor	The forward contactor did not engage.	4-18
1006	Reverse Contactor	The reverse contactor did not engage.	4-18
1007	Forward End of Travel Limit	The machine is at the forward end of travel limit.	4-19
1008	Reverse End of Travel Limit	The machine is at the reverse end of travel limit.	4-19
1112	Positioner not in ready state for Color Change	The positioner has not reached the proper location for color change.	4-19
200x, 210x	**Reciprocator**		
2001	E-Stop Open	The E-Stop circuit is open.	4-24
2002	Encoder failure	The encoder is not responding when motion is commanded or is responding with defective signals.	4-24
2003	Motor Protector	The motor protector is open.	4-25
2004	Motion Controller	The motion controller indicates a failure.	4-25
2005	Forward Contactor	The forward contactor did not engage.	4-25
2006	Reverse Contactor	The reverse contactor did not engage.	4-25
2007	Forward End of Travel Limit	The machine is at the forward end of travel limit.	4-26
2008	Reverse End of Travel Limit	The machine is at the reverse end of travel limit.	4-26
2101	Part size less than minimum	The part detected is too small. The reciprocator will attempt to stroke at the minimum length.	4-26
2102	Lead gun not defined − using gun 1	The lead gun on the reciprocator is not defined.	4-26
2103	Trail gun not defined − using gun 1	The trailing gun on the reciprocator is not defined.	4-26
2104	Trail gun less than lead −		

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Code	Message Text	Description	Refer to Page
trail = lead	The trailing gun number is less than the lead gun number.	4-26	
2105	Pattern width not set − using 12 inches (305 mm)	The pattern width has not been set using default.	4-26
2106	Vertical scanner not configured − recip mode 1 invalid	A vertical scanner is required for variable stroke operation.	4-26
2107	Speed calculated less than minimum	The speed of the reciprocator is less than the minimum value allowed.	4-27
2108	Speed calculated greater than maximum	The speed of the reciprocator is greater than the maximum value allowed.	4-27
2113	Reciprocator not in ready state for Color Change	The reciprocator is not in the proper position for color change.	4-27
			Continued...
300x	Watchdog		
3100	Positioner Watchdog fault	The remote Ethernet device did not respond with a watchdog signal in 1 second.	4-19
3200	Reciprocator Watchdog fault	The remote Ethernet device did not respond with a watchdog signal in 1 second.	4-27
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.	4-19
4110	Clean cycle aborted by user action − park release detected	Clean cycle aborted by user − part release was detected.	4-19
4111	Clean cycle aborted detected machine lockout/watchdog	A machine malfunction aborted the cleaning operation.	4-19

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CAN Network Errors

Table 1-2 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 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 2 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 2 PC to CAN 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		

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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 1-3 Gun Card Error and Fault Codes

Error Code	Message	Fault Code	Meaning/Correction
301	Micro-Amp fault detected	–	Micro-amp value out of range.
302	Over-current fault detected	E15	Over-current detected. Clear the fault, 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	Micro-amp 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...

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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.
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.

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Gun Card LEDs

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

Table 1-4 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 cardthis LED will light. If you have an odd number of guns in the system, unplug theunused 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 malfunctioncannot 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. Replacethe card if the other gun control cards have heartbeats.
Gun Limit B (even-numberedgun	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 1-3.
Gun Limit A (odd-numberedgun)			
Power	Green	Lights 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 thelocking tab is working correctly. Replacethe card if the other gun control cards have power.

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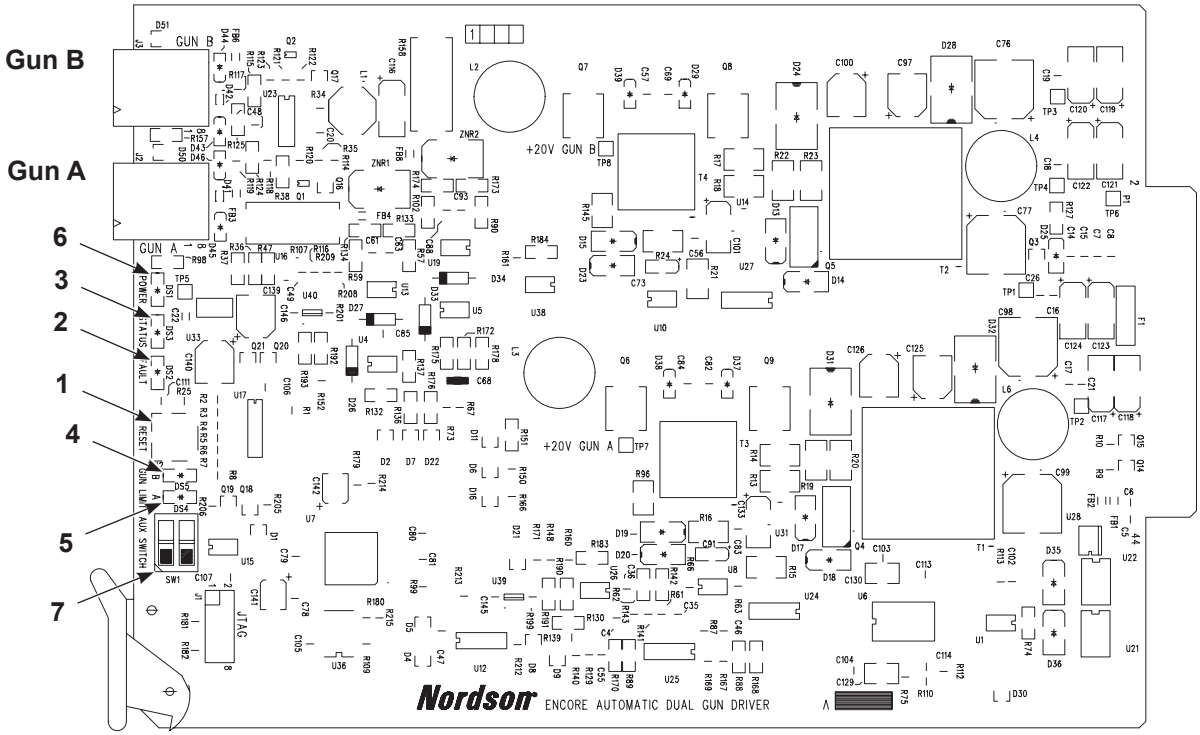


Figure 1-1 Gun Control Card LEDs and Switches

1. Reset switch (reboots the on-board processor)
2. Fault LED (red)
3. Status LED (green)
4. Gun Limit B LED (yellow)
5. Gun Limit A LED (yellow)
6. Power LED (green)
7. SW1 (2 position DIP switch for future use)

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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 2 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 2 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 be off.
4. Press and hold pushbutton switch SW2 for about two seconds, until the red LED turns on. Release the button. The LED will turn off again in about seven seconds. The module is now re-zeroed.
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.

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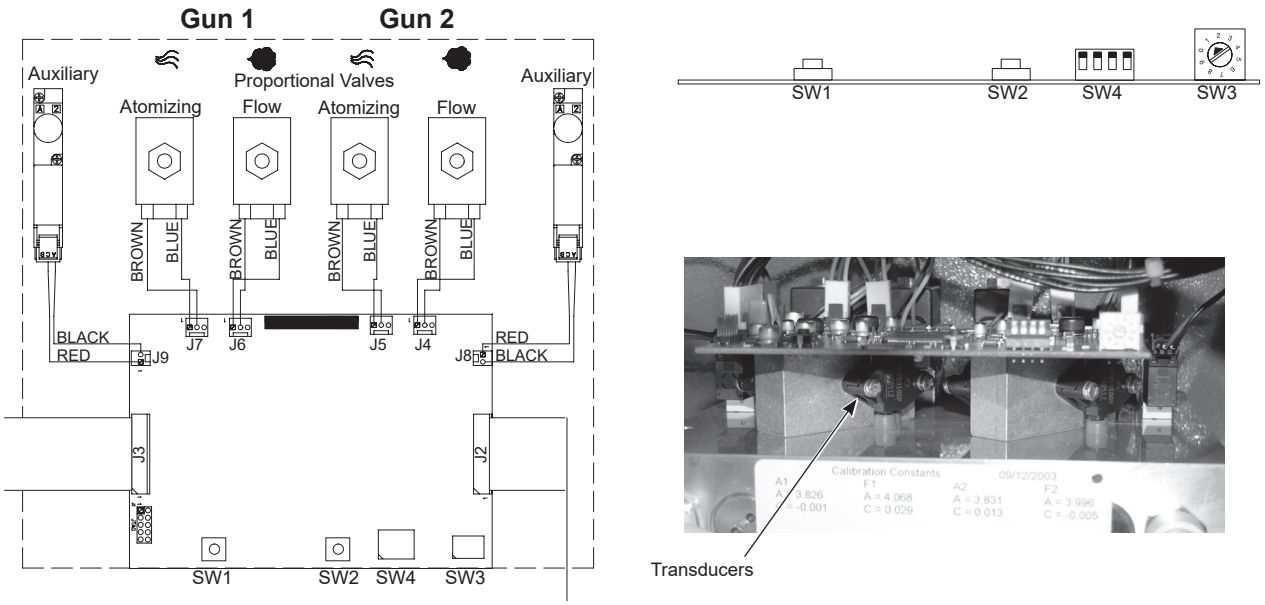


Figure 1-2 iFlow Module Switches, Flow and Atomizing Proportional Valves, and Transducers

iFlow Module Error Codes and Fault Codes

Faults F1 − F7 will activate the alarm relay.

Table 1-5 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. Disconnect the air tubing from the iControl 2 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.
405	Atomize airflow low	F5	

Continued...

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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.

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Ethernet Network Troubleshooting

All Ethernet 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 to diagnose problems with the remote nodes.

Table 1-6 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 main electrical control panel 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 2 PC. **If a single node fault is displayed:** Check the electrical power to the remote node. Check network cables and connections between the remote node and the Ethernet switch in the main electrical control panel.
906	Socket library error	Programming error. Contact Nordson technical support.
907	TCP port already bound	Programming error. Contact Nordson technical support.
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.

Continued...

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Error Code	Message/Condition	Correction
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 PLC functions.
925	Illegal Function exception response	Programming error or remote hardware error. Check PLC functions.
926	Illegal Data Address exception response	Programming error or remote hardware error. Check PLC functions.
927	Illegal Data Value exception response	Programming error or remote hardware error. Check PLC functions.
928	Slave Device Failure exception response	Programming error or remote hardware error. Check PLC functions.
–	Watchdog Fault (any remote node controller fault)	Control program in PLC 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 PLC mode selection switch. The switch should be in the run (up) position. Replace the PLC. The replacement must be pre-programmed or a program must be downloaded and installed in the field. Contact Nordson Industrial Coating Systems 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.
–	I/O error class	Programming error. Contact Nordson technical support.
	Fieldbus protocol error class	Programming error. Contact Nordson technical support.

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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 *Ethernet Network Troubleshooting* if the fault messages indicate a communications problem (Watchdog fault or TCP/IP communications fault).

Each fault message displayed on the iControl 2 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 1-7 In/Out Positioner Error Code Troubleshooting

Error Code	Message	Correction
1001	E-Stop Open	Determine why E-Stop button on system electrical control panel or a remote panel 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 2 alarm screen.

Continued...

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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 (if applicable)/ 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 or similar control circuitry did not operate when the in/out positioner was commanded to move forward. Check control circuit and devices that command the motor for proper operation. Repair or replace components as needed. This fault must be reset from the iControl 2 alarm screen.
1006	Reverse Contactor Fault	Auxiliary contact on the motor reverse contactor or similar control circuitry did not operate when the in/out positioner was commanded to move in reverse. Check control circuit and devices that command the motor for proper operation. Repair or replace components as needed. This fault must be reset from the iControl 2 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 2 alarm screen.

Continued...

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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 2 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 2 alarm log for Watchdog or TCP/IP faults. Refer to *Ethernet Network Troubleshooting*.

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Other In/Out Positioner Troubleshooting

Table 1-8 Other In/Out Positioner Troubleshooting

Problem	Possible Cause	Corrective Action
No movement from in/out positioner in response to move command	A fault has occurred preventing operation.	Check the iControl 2 alarm log. Identify the fault and review the fault troubleshooting information in this table.
	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 2 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 2 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 2 alarm screen. Identify the fault and correct. Review the related faults and corrections listed in this table.
	iControl 2 in/out positioner configuration settings have not been completed.	Refer to *Network Configuration and In/Out Positioner Configuration* in the iControl 2 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...

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Problem	Possible Cause	Corrective Action
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 2 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 2 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 2 system. Refer to *Photoeye, Encoder, and Conveyor Interlock Troubleshooting*. 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 2 Operator Interface manual. Check for scanner remote node communication failure on the Network Node Status screen and Node Configuration screens. Refer to *Ethernet 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 Analog 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...

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Problem	Possible Cause	Corrective Action
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 positionvalues to less than reverse limit switchposition 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 2 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 2 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...

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Problem	Possible Cause	Corrective Action
In/Out Positioner actual travel distance does not match value shown on iControl 2 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.

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Reciprocator Troubleshooting

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

Each fault message displayed on the iControl 2 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 1-9 Reciprocator Error Code Troubleshooting

Error Code	Message	Correction
2001	E-Stop Open	Determine why E-Stop button on system electrical control panel or remote panel 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 2 alarm screen.

Continued...

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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 (if applicable). 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 or similar control circuitry did not operate when the in/out positioner was commanded to move forward. Check control circuit and devices that command the motor for proper operation. Repair or replace components as needed. This fault must be reset from the iControl 2 alarm screen.
2006	Reverse Contactor Fault	Auxiliary contact on the motor reverse contactor or similar control circuitry did not operate when the in/out positioner was commanded to move in reverse. Check control circuit and devices that command the motor for proper operation. Repair or replace components as needed. This fault must be reset from the iControl 2 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 2 alarm screen.

Continued...

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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 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 2 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 2 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...

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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 1-10 Other Reciprocator Troubleshooting

Problem	Possible Cause	Corrective Action
No movement from reciprocator in response to move command	A fault has occurred preventing operation.	Check the iControl 2 alarm log. Identify the fault and review the fault troubleshooting information in this table.
	Configuration lockout applied to reciprocator.	Check the Reciprocator control screen for the lockout indicator. Lockout is applied from the Configuration screens.
	iControl 2 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...

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Problem	Possible Cause	Corrective Action
No movement from reciprocator in response to move command (continued)	Remote disable applied to reciprocator controller. No status display on iControl 2 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 2 alarm screen. Identify the fault and correct. Review the related faults and corrections listed in this table.
	iControl 2 reciprocator configuration settings have not been completed.	Refer to *Network Configuration and Reciprocator Configuration* in the iControl 2 Operator Interface manual. Make sure all required settings have been made and are correct.
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 2 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.

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Problem	Possible Cause	Corrective Action
Reciprocator measured osition does not alue shown ator	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 or chain drive sprocket slipping.	Make sure the drive 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 or chain 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.
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 2 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.
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 2 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.

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Other Fault Messages and Conditions

Table 1-11 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 2 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 2 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.

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Photoeye, Encoder, and Interlock Troubleshooting

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

Table 1-12 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 I/O board (see Figure 7-4 for the settings). If settings are correct, replace the I/O board and ribbon cable. 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.

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Part ID Status Screen

See Figure 4-3. Use the iControl Part ID Status screen  to assist in troubleshooting the photoeye, encoder, and interlock signals.

Viewing the Part ID Status screen allows user to confirm that the computer is properly reading the input signal from the board.

The input signal state is shown at the bottom of the screen as DI (Digital Input), and reads from right to left as 0 to 23.

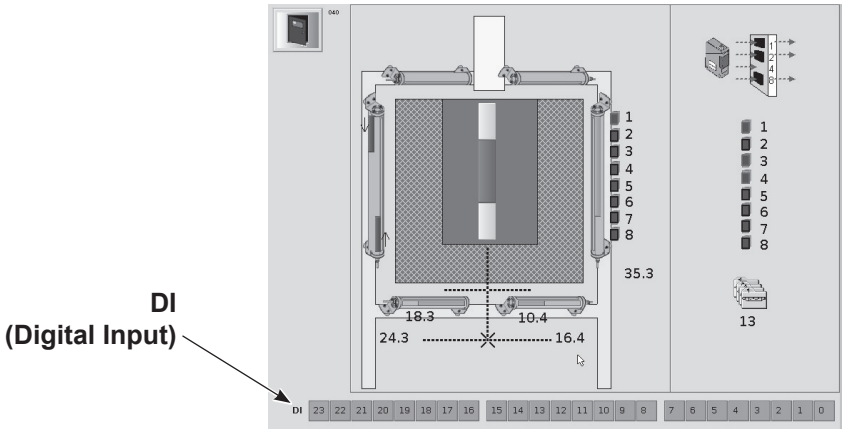


Figure 1-3 Part ID Status Screen

Startup Messages

When starting the iControl, information cycles through on the screen during the boot process. If a malfunction is detected, the screen will display troubleshooting information.

CMOS Battery Failure

The CMOS backup battery is only in use when the iControl is powered OFF. The shelf life of the battery is 10 years, and has less than one year of applied use. See the *Repair* section for battery replacement instructions.

Messages relating to CMOS battery failure could be due to

- CPU having been changed
- Battery used to retain CMOS memory has failed

If the iControl stops booting on message for *Hit ESC for .altboot*…with either a *D* or and *S* showing on the screen, either the program CompactFlash has failed or the PC has failed. Obtain and install a new program CompactFlash and restart the system. If this does not correct the problem, replace the PC.

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Touch Screen Troubleshooting

Touch Screen Calibration

The touch screen is calibrated at the factory. If you change a program card, or the iControl 2 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 2 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 2 button to start the **iControl 2** 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 2** button to start the iControl 2 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.

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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 2 screens, or if you install a program card previously used in another iControl 2 console.

1. Turn off the iControl 2 console power.
2. Open the iControl 2 console door and connect a USB mouse to the iControl 2 PC.
3. Turn on power and allow the operating system to load. The CAL button is displayed on the touch screen before the iControl 2 software loads.
4. Use the mouse to move the cursor to the CAL button and click on it. The touch screen calibration procedure starts.

   NOTE: If you miss the CAL button, allow the iControl 2 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 2 button to start the iControl 2 software.
6. Test the touch screen calibration, then perform a program shutdown, turn off console power, and disconnect the mouse. Close the iControl 2 cabinet door before re-starting the system.

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No Touch Screen Display

Check the following:

- Check the power LED on the front bezel below the screen. If the LED is not lit then the PC is not powered up.
- Make sure the system power switch is on.
- Make sure the video and serial cables between the PC and the touch screen is connected.

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.
- 12Vdc supply to the touch screen
- 24 Vdc supply to the PC

Touch Screen Failure

WARNING: Do not spray powder with the iControl 2 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 2 PC.

Temporary Fix: Connect a USB mouse to the iControl 2 PC. You should now be able to use the mouse to point and click on screen buttons and data fields. Replace the iControl 2 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 2 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 2 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 2 PC as soon as possible.

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Section 1
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 2 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 2 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 console or pedestal that can be repaired by the customer except for the iFlow modules.

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

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

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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 2 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.

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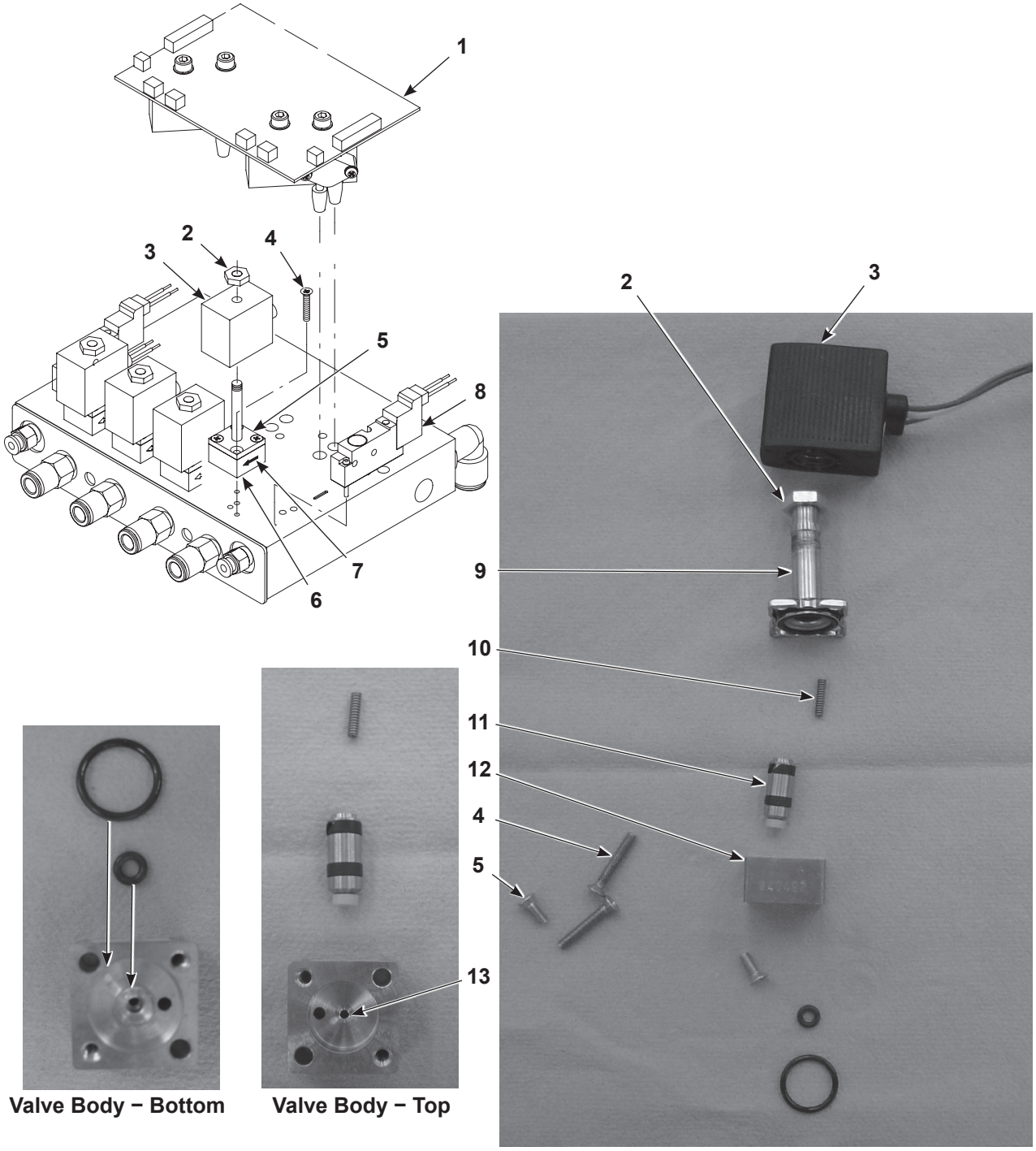


Figure 1-1 iFlow Module Proportional Valve Removal and Replacement

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

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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 2 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 2 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.

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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

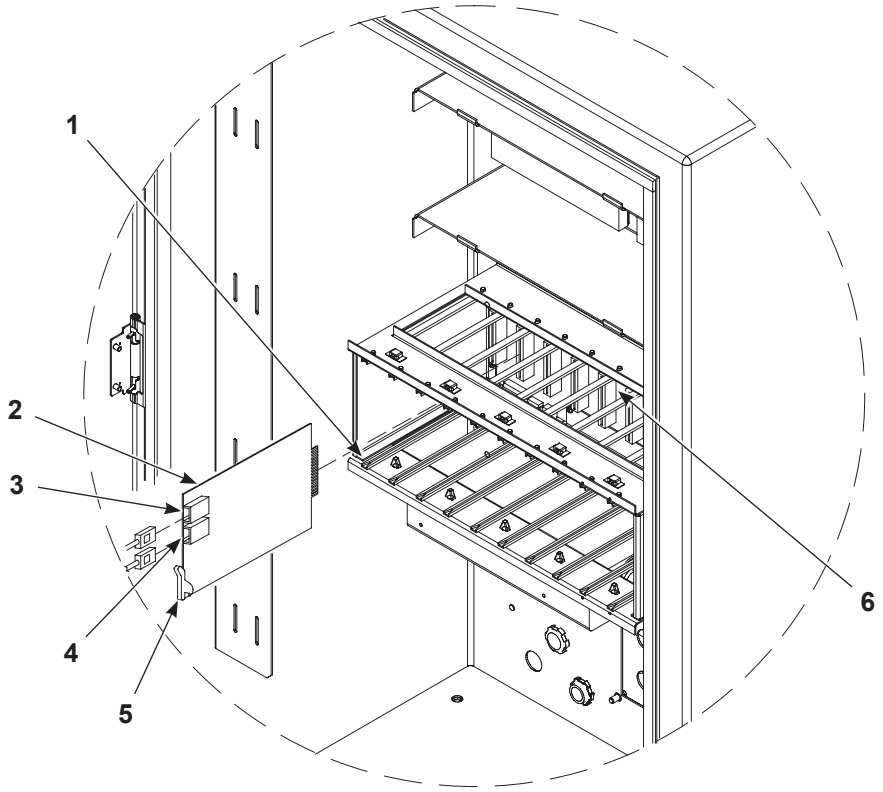


Figure 1-2 Gun Control Card Replacement

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

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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 2 computer to the I/O card will cause catastrophic failure of the PC I/O card. 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 have a red or blue trace 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.

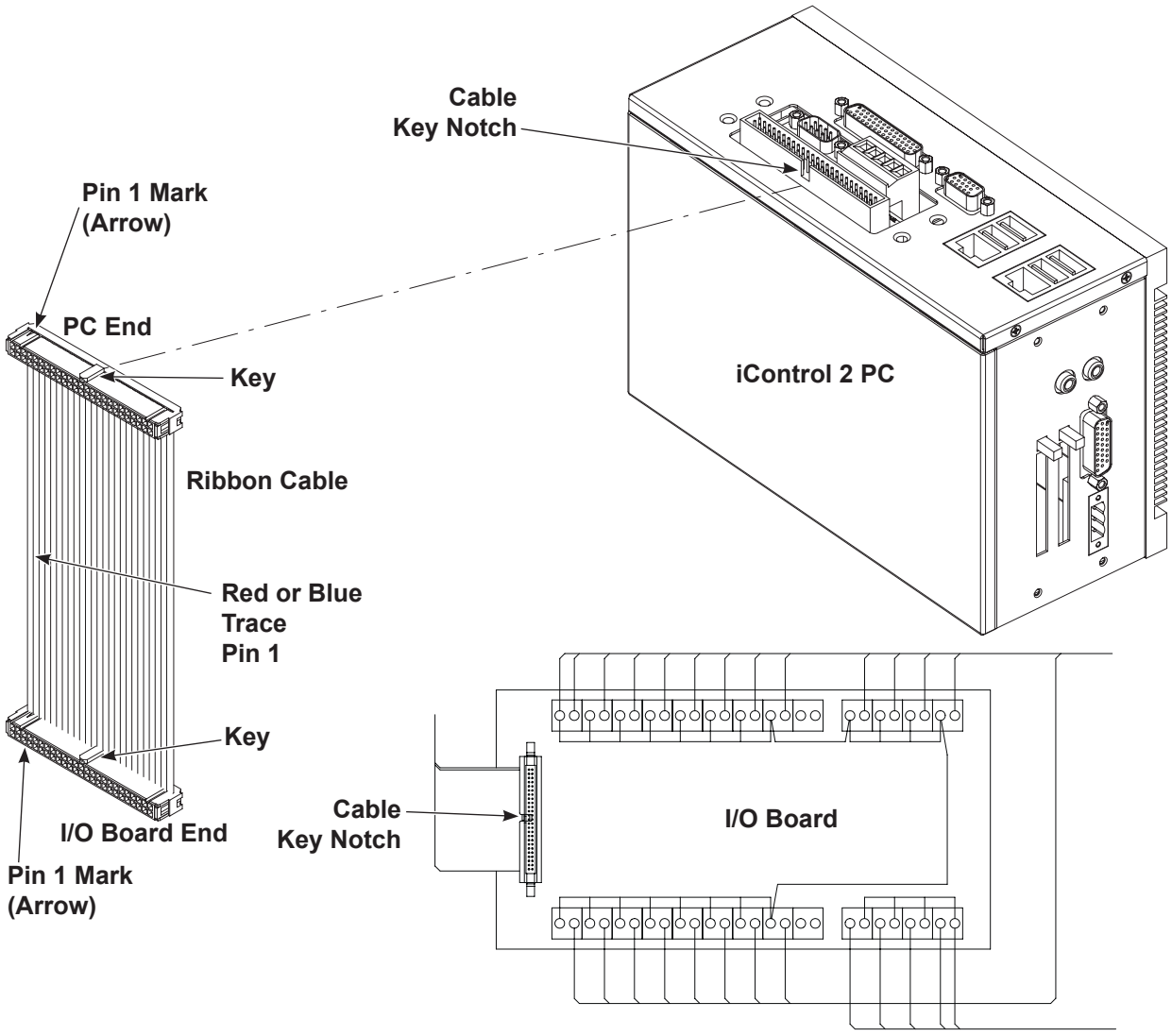


Figure 1-3 PC−I/O Board Ribbon Cable Connections

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Touch Screen Replacement

NOTE: Gaskets are glued to the console and pedestal around the display opening. Do not damage or remove these gaskets as that will destroy the dust-tight integrity of the enclosure and void agency approvals.

1. Power off the iControl 2 system.
2. Disconnect the blue video cable, touch screen serial cable, and power cable harness from the back of the old touch screen unit and set aside.

See Figure 5-4.

3. Remove the mounting nuts (3) from the mounting clamp (2) and set aside.
4. Install the replacement touch screen (1) onto the mounting clamp (2) and tighten all mounting nuts (3) to 2.5 N•m (22 in-lbs).

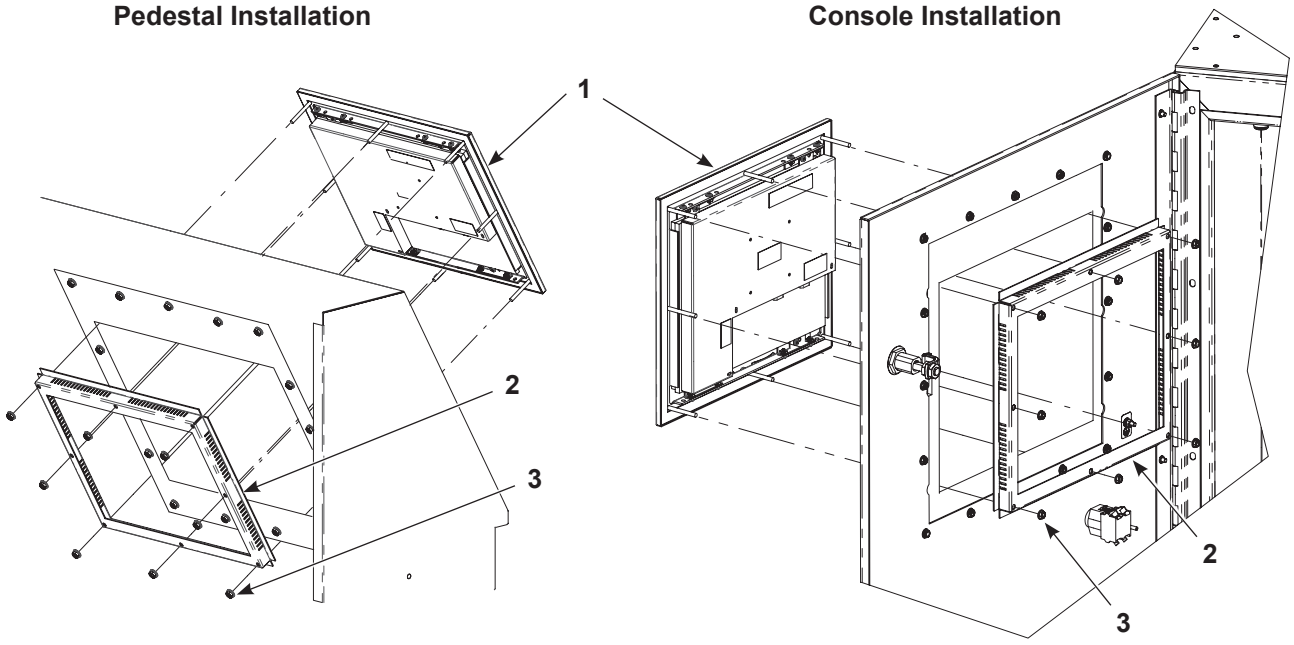


Figure 1-4 Touch Screen Replacement

1. Touch screen
2. Mounting clamp
3. Mounting nut

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Touch Screen Replacement (contd)

See Figure 5-5.

5. Connect the touch screen serial cable to the touch screen serial port (6) the same way as the original.
6. Discard the 90 degree video cable and connect the replacement video cable to the video port (5) the same way as the original.
7. Connect the replacement power cable harness (7) to the touch screen terminal block (4) as shown.
8. For pedestal installations, use the short cable and connect to the relay board terminal block (8) as shown. For console installations, use the long cable and route the power cable harness (7) through the cabinet and connect to the relay board terminal block (8) as shown.

NOTE: Both the short and long power cable harnesses are included in the touch screen replacement kit. Use the short power cable for pedestal system installations and use the long power cable for console system installations.

NOTE: The touch screen is calibrated at the factory. If changing the program card, replacing the iControl 2 PC, or having problems touching screen components accurately, recalibrate the screen using the *Touch Screen Calibration* instructions in the *Encore iControl 2 Integrated Control System* manual.

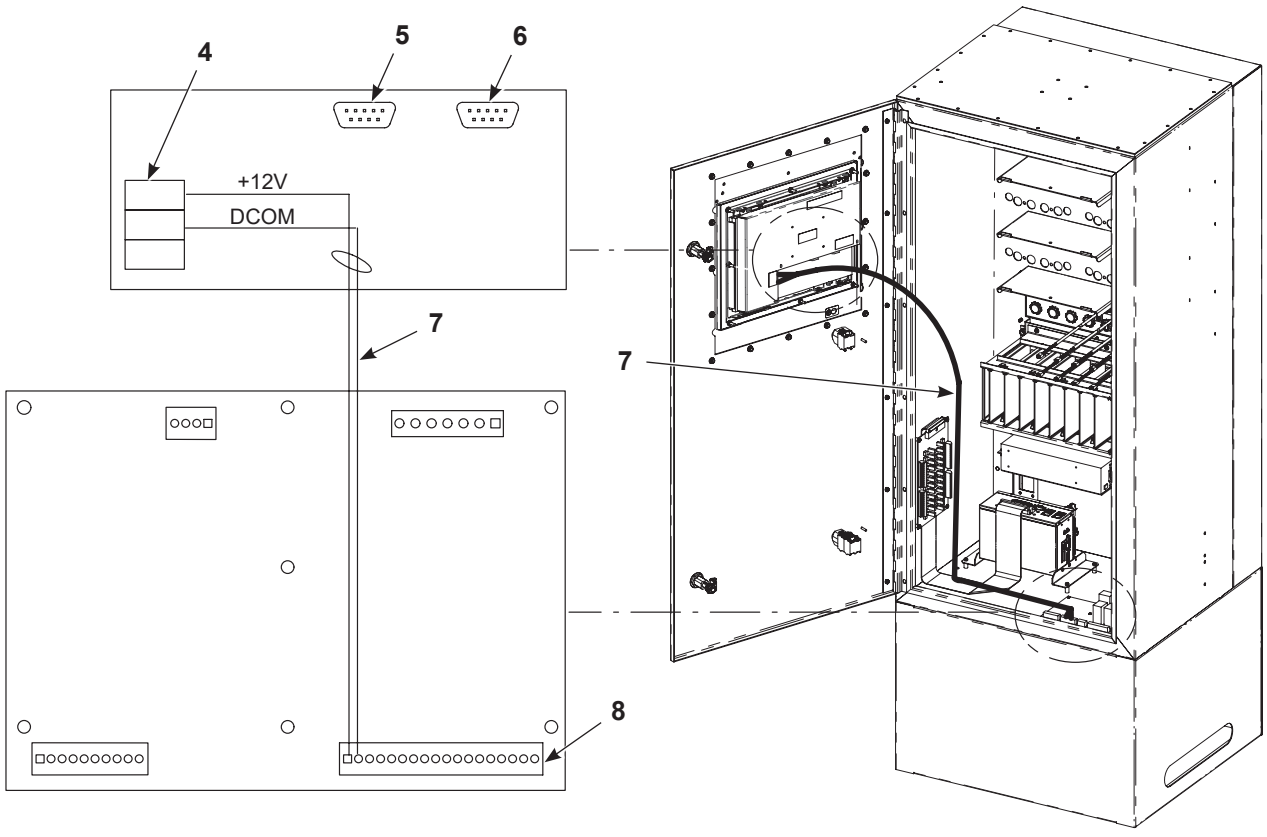


Figure 1-5 Touch Screen Connections

4. Touch screen terminal block
5. Video port
6. Touch screen serial port
7. Power cable harness
8. Relay board terminal block

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CMOS Battery Replacement

WARNING: Power to the iControl must be OFF before performing replacement procedure. Perform a *Program Shutdown* detailed in the Configuration section of the iControl Operator Interface manual for proper shutdown procedure. Failure to use proper shutdown procedures could cause serious personal injury or death, or damage the equipment.

A battery and USB keyboard are required for this procedure. Depending on the version of PC, the battery type and location may vary. See Figure 5-6 to determine the PC version and the type of battery required for replacement.

NOTE: If replacing battery (BAT1) on Version 1 board, the BAT3 battery can be used as a replacement, as long as the plastic tab has not been removed from it. If plastic tab was previously removed, BAT3 battery will not be usable.

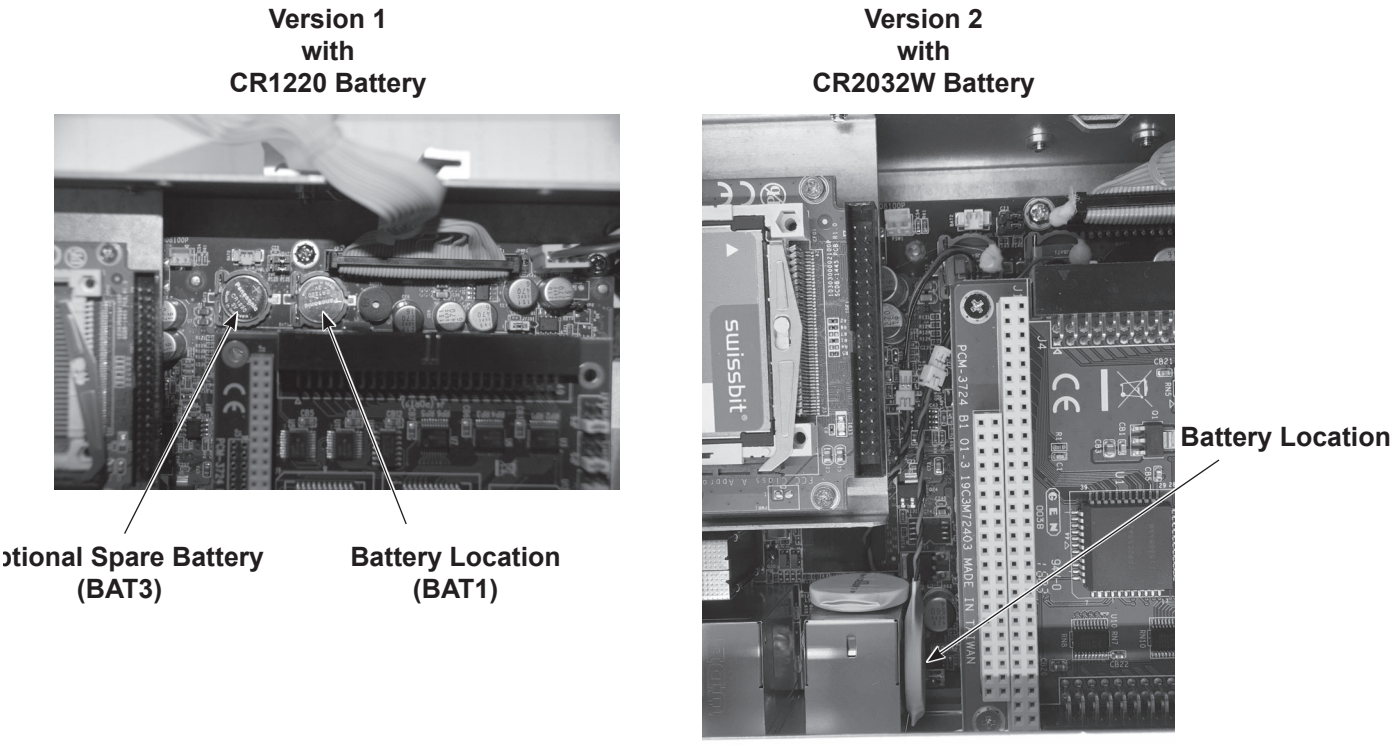


Figure 1-6 Battery Type and Location

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CMOS Battery Replacement (contd)

1. See Figure 5-7. From inside the iControl cabinet, disconnect any wiring or cables from the PC (2).
2. Remove the PC from the iControl by removing the din rail screws (1).
3. Remove the PC front panel (3) by removing the front panel screws (4).

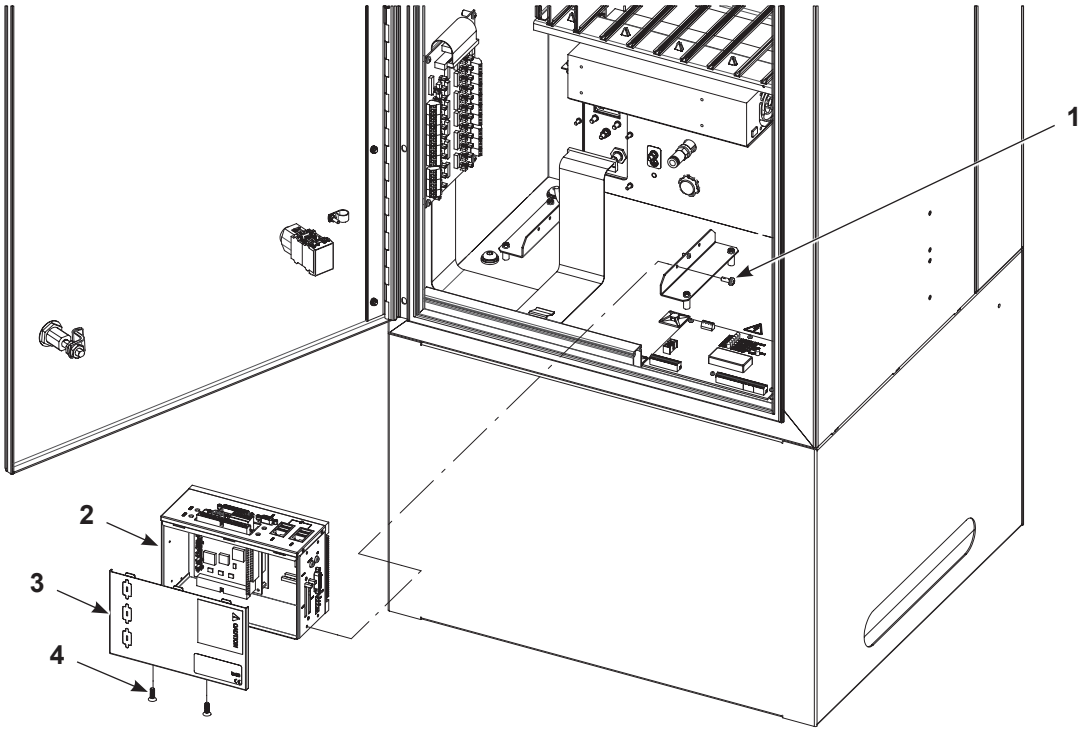


Figure 1-7 Removing PC

4. See Figure 5-8. Disconnect the ribbon cable (5) from CompactFlash adapter for access to the battery.

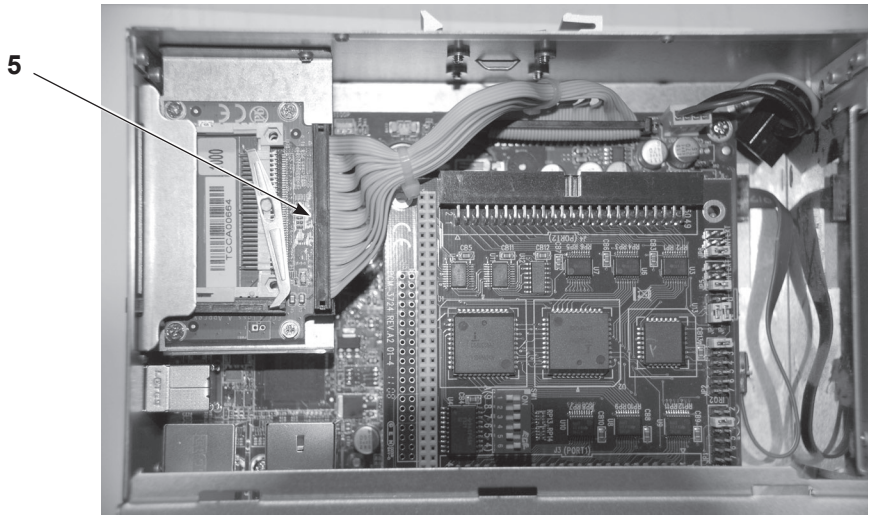


Figure 1-8 Disconnect CompactFlash Adapter

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5. Remove battery.

NOTE: See Figure 5-9. Location and type of battery varies depending on version of the PC board.

   a. Version 1 − Remove BAT1 (7) battery by placing the head of a small flat head screwdriver under the battery to lift out from board.

   b. Version 2 − Pull the battery assembly (9) from the two-sided tape holding it to the board fixture. Disconnect the battery harness (8) to remove battery from board.

6. Install new battery.

   a. Version 1 − Install new battery (7) onto board, observing proper orientation of battery.

   b. Version 2 − Connect new battery harness (8), and push battery assembly (9) onto board fixture with double-sided tape.

7. Reconnect ribbon cable to CompactFlash adapter.

   NOTE: The ribbon cable connector is keyed for proper installation.

8. Using retained hardware, reinstall PC cover, and mount PC back onto din rail.

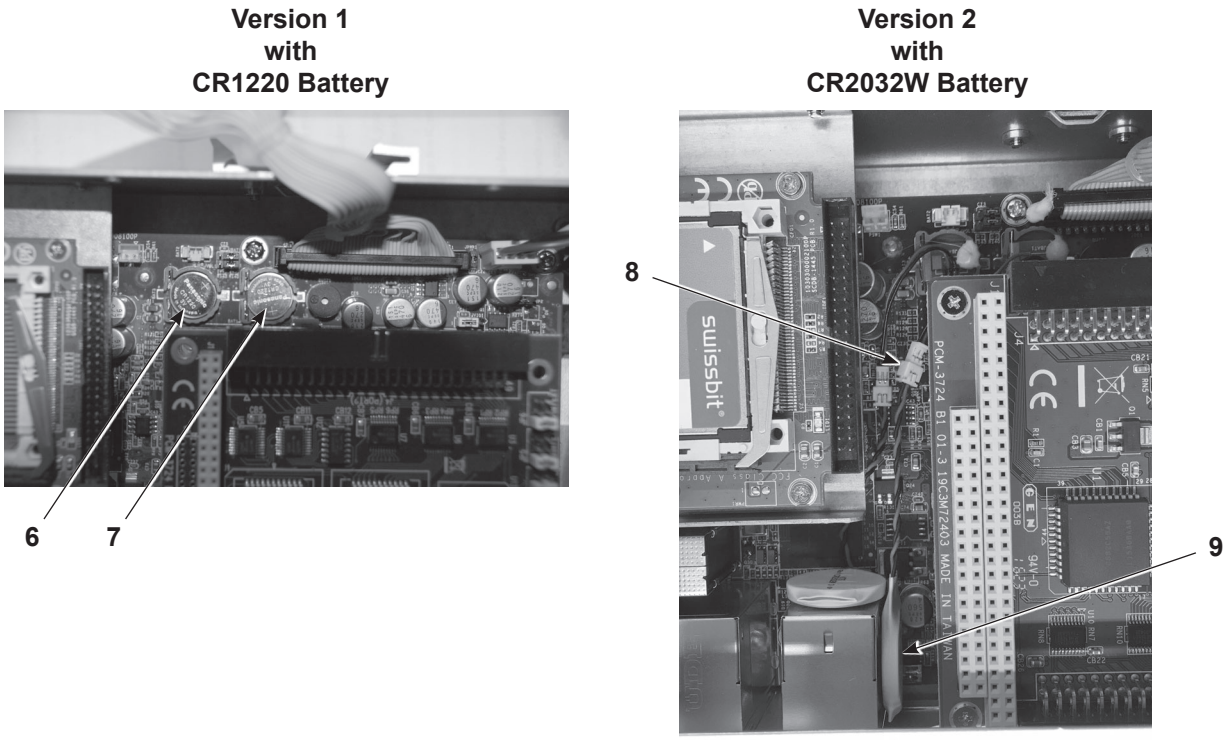


Figure 1-9 Battery Replacement

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Clearing Error Code

1. Connect a USB keyboard to the PC and apply power to the PC.
2. When CMOS failure message appears on iControl screen, press the DEL key as indicated on the Setup screen.
3. See Figure 5-10. From the Setup Utility screen, use the arrow keys to make sure the Standard CMOS Features is highlighted and press Enter to advance to the Standard CMOS Features screen.
4. Use either the +/− or PgUp/PgDn keys to set the date and time. Continue to use the arrow keys to navigate between fields.
5. After date and time are set, press F10 to save changes, and Enter to confirm save command and exit.
6. Disconnect the keyboard, close iControl panel, and return system to normal operation.

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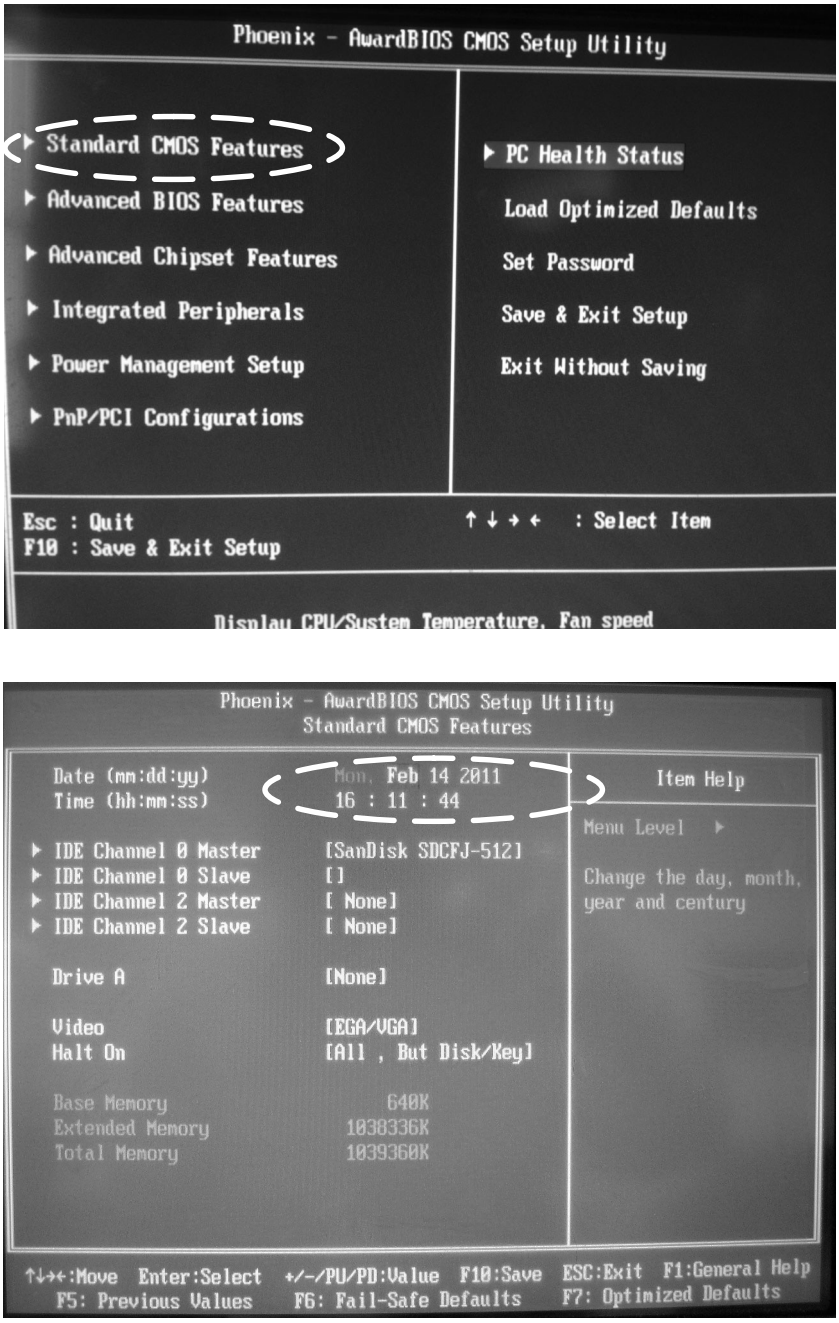


Figure 1-10 CMOS Screens

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Section 1

Parts

Introduction

To order parts, call the Nordson Industrial Coating Systems Customer Support Center at (800) 433 contact or your local Nordson representative.

iControl 2 Controllers and Interconnect Cables

Part	Description	Note
Main Consoles		
1603116	Controller, Encore, iControl 2, 4 gun, main console	
1603117	Controller, Encore, iControl 2, 6 gun, main console	
1603118	Controller, Encore, iControl 2, 8 gun, main console	
1603119	Controller, Encore, iControl 2, 10 gun, main console	
1603120	Controller, Encore, iControl 2, 12 gun, main console	
1603121	Controller, Encore, iControl 2, 14 gun, main console	
1602788	Controller, Encore, iControl 2, 16 gun, main console	
1603122	Controller, Encore, iControl 2, 4 gun, main w/pedestal	
1603123	Controller, Encore, iControl 2, 6 gun, main w/pedestal	
1603124	Controller, Encore, iControl 2, 8 gun, main w/pedestal	
1603125	Controller, Encore, iControl 2, 10 gun, main w/pedestal	
1603126	Controller, Encore, iControl 2, 12 gun, main w/pedestal	
1603127	Controller, Encore, iControl 2, 14 gun, main w/pedestal	
1603128	Controller, Encore, iControl 2, 16 gun, main w/pedestal	
Auxiliary Consoles		
1603583	Controller, Encore, iControl 2, 4 gun, auxiliary console	
1603584	Controller, Encore, iControl 2, 6 gun, auxiliary console	
1603585	Controller, Encore, iControl 2, 8 gun, auxiliary console	
1603586	Controller, Encore, iControl 2, 10 gun, auxiliary console	
1603587	Controller, Encore, iControl 2, 12 gun, auxiliary console	
1603588	Controller, Encore, iControl 2, 14 gun, auxiliary console	
1603589	Controller, Encore, iControl 2, 16 gun, auxiliary console	

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Part	Description	Note
Interconnect Cables		
1603260	Cable interconnect, CB1, 15 meter, iControl 2 (Main to Aux)	A
1603261	Cable, interconnect, PJ2, 15 meter, iControl 2 (Aux to Pedestal)	
1603262	Cable, interconnect, PJ2, 30 meter, iControl 2 (Aux to Pedestal)	
1603657	Cable, interconnect, CA1, 10 meter, Plug-N-Spray	B
1603665	Cable, interconnect, PM1, 10 meter, Plug-N-Spray	C
1603282	Cable, interconnect, Ethernet, male/female, 10 meter	D
1603256	Harness, interconnect, PJ1, iControl 2 with pedestal, 15 meter (Aux to Pedestal)	
1602711	Harness, interconnect, PJ1, iControl 2 with pedestal, 30 meter (Aux to Pedestal)	
1602871	Harness, Part ID, PD1, iControl 2 (Main Console to Part ID Junction Box)	E
1603103	Cable, AC power, 10 meter, auxiliary, iControl	F
1604310	Cable, interconnect, CA1, 15 meter, Plug-N-Spray	G
1604311	Cable, interconnect, CA1, 15 meter, Plug-N-Spray, auxiliary	H

NOTE: A. CAN Network − Main Console to Auxiliary Console (CB1).

B. Power − Main Electrical Control Panel to Main Console (CA1). C: Ethernet − Main Electrical Control Panel to Main Console (PM1).

C. Ethernet − Main Electrical Control Panel to Part ID Junction Box (PM2). E: Power and Signals − Main Console to Part ID Junction Box (PD1).

D. Power − Main Electrical Control Panel to Auxiliary Console (CA1). G: Extended length replacement for 1603657.

E. Extended length replacement for 1603103.

Main/Auxiliary Console Parts

See Figure 6-1 for the location of the parts listed in this table:

Item	Part	Description	Quantity	Note
1	939122	Seal, conduit fitting, blue	AR	
2	984526	Nut, lock, 1/2 in. conduit	AR	
3	334800	Plug, 1/2 in. Pipe, 1 in. hex	AR	
4	1602905	Hose assembly, 3/4 in., 1-1/16−12, swivel	1	
5	1603613	Cap, receptacle, female, eternal thread, 7/8−16UN	AR	
6	241040	Muffler, 1/8 in. NPT	1	
7	1621215	KIT, retrofit, 100 CFM air filter	1	G
7A	1614705	• ELEMENT, filter, air, 5 micron	1	H
8	326139	Plug, blanking, 4 mm tube	AR	
9	973143	Elbow, pipe, 90 degree, 3/4 in., steel, zinc plt	1	

AR: As Required

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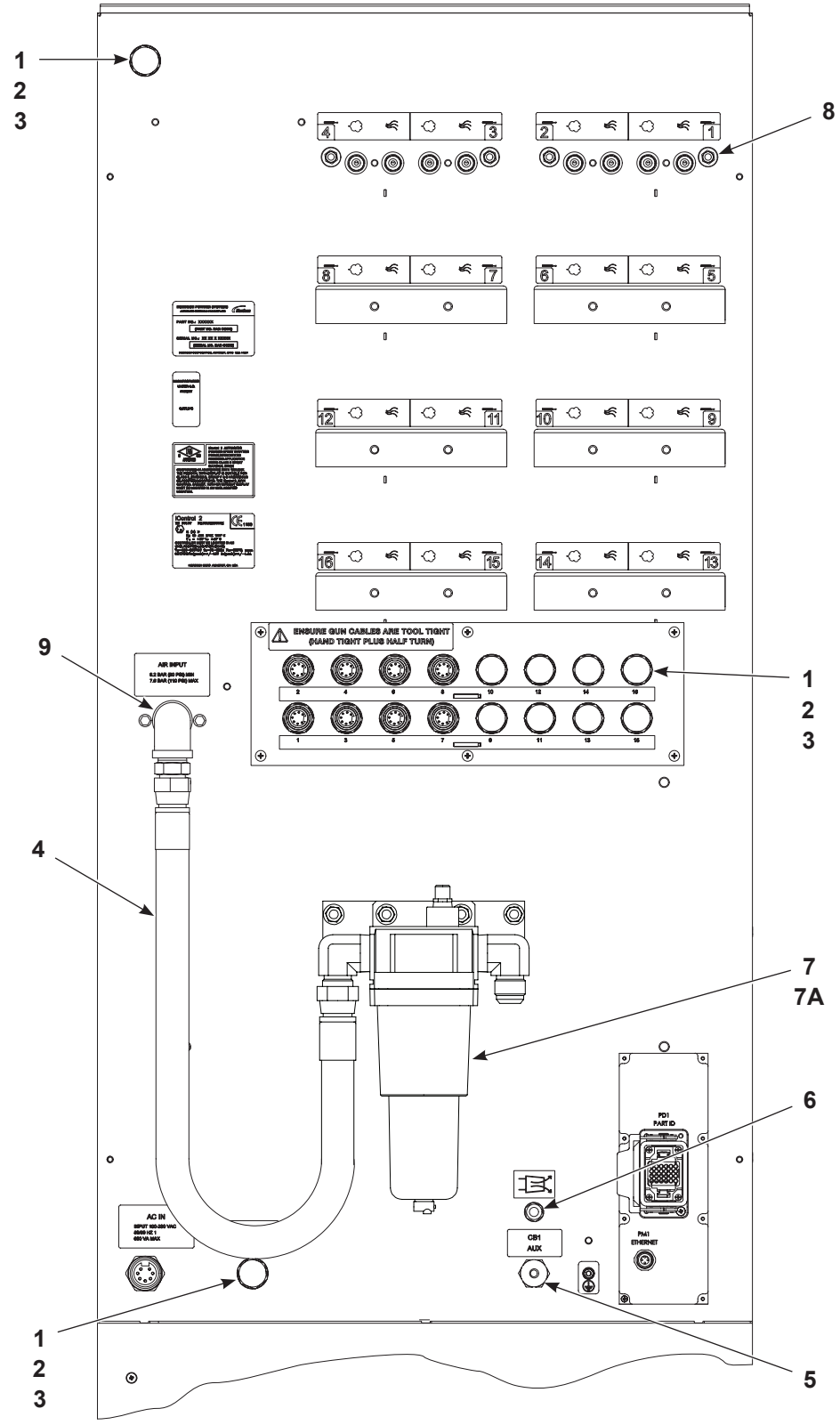


Figure 1-1 Main and Auxiliary Console Parts − Rear View(1 of 3)

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Main/Auxiliary Console Parts (contd)

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

Item	Part	Description	Quantity	Note
11	------	Gasket, control cabinet, iControl 2	1	
12	1602709	Fan assembly, iControl 2	1	
13	1036657	Module, digital airflow control, packaged	AR	B
14	1608095	Kit, iControl 2, display, touch screen w/ cable	1	A, E
14A	------	Gasket, bezel, iControl	1	A
15	1000594	Switch, keylock, 3-position	1	A
16	1000595	Contact block, 1-N.O. And 1-N.C. contact	1	
17	1023939	PCA, backplane, iControl	1	
18	1107144	KIT, Encore dual gun driver PCA	AR	C
19	1602710	Receptacle 8-position, gun, 0.4 m	AR	C
20	------	Jumper, gun ID, odd number	1	D
21	------	CPU, Arbor, iControl 2, Rev 2	1	A, F
22	------	Kit, software, iControl	1	A
22A	------	• Memory, programmed, iControl	1	
22B	1034281	• Memory, Compact Flash (blank, for user data)	1	
23	1098442	Power supply, 400W, +24V, +/−12V, +5V, 5 slot	1	
24	1602862	Terminal block assembly, fuse	1	
24A	939709	• Fuse, 10A, fast-acting, 250V	2	
25	334806	Switch, round, 2 position, 90 degree	1	
26	288806	Contact block, 2-N.O. contacts	1	
27	1610832	Kit, 24 channel opto-input interface card, iControl 2	1	A
27A	1602718	• Cable, ribbon, iControl 2	1	A

NOTE:
A. If using pedestal, these items will be located in the pedestal.
B. Refer to iFlow Module Parts for repair parts.
C. One card drives two automatic spray guns. One receptacle is used for each gun.
D. Plug into unused gun card receptacle when gun is not used. Prevents the fault LED from lighting when an odd number of guns is connected to the card.
E. Both the long and short power cable harnesses are provided in the touch screen installation kit. Use the long power cable harness for console installations.
F. When replacing Arbor PC, order kit 1612971, which includes a Rev 2 Arbor PC and new programmed CompactFlash.
G. If replacing old filter assemblies 1047526 or 1602855, order kit 1621215 that includes all parts and instructions to upgrade to new filter.
H. Filter elements are not interchangeable between new filter assembly 1621215 and old filter assemblies 1047526 and 1602855. For old filter assemblies 1047526 and 1602855, order filter element 1047524.

Continued...

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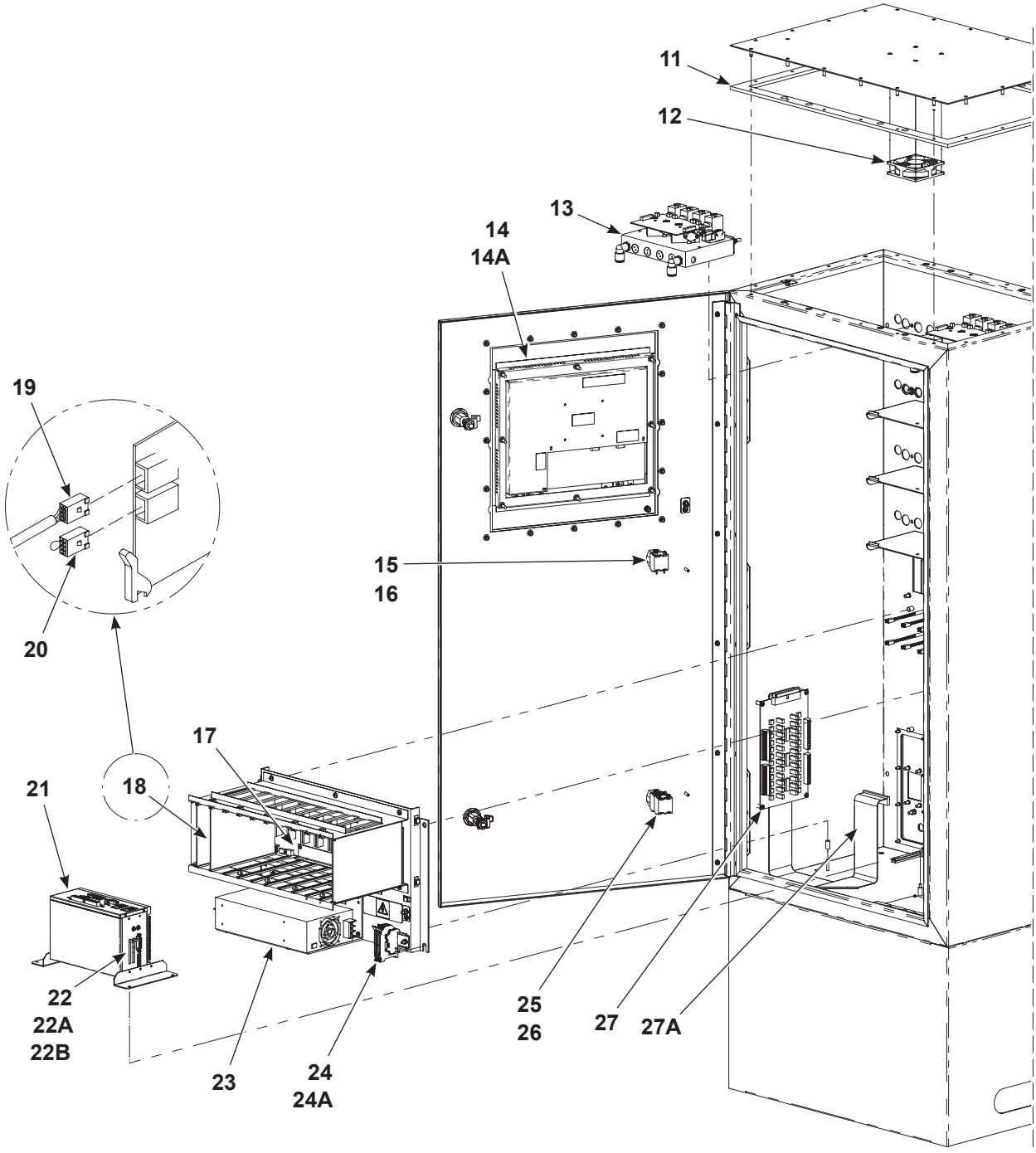


Figure 1-2 Main and Auxiliary Console Parts − Internal Components (2 of 3)

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Main/Auxiliary Console Parts (contd)

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

Item	Part	Description	Quantity	Note
28	183418	Plug, 12 mm, tube	AR	
29	972240	Connector, male, elbow, 12 mm tube x 1/2 uni	AR	
30	1033878	Regulator, rolling diaphragm, 0−120, 1/2 NPT	AR	
31	1034000	Fitting, 1/2 RPT x (4) 10 mm tube	AR	
32	148256	Plug, 10 mm tubing	AR	
33	1603591	PCA, relay board, iControl 2	1	A
34	1609757	Power supply, 24 Vdc, 120 W	1	A
35	1603114	Terminal block, AC/DC converter and fuse	1	
35A	114876	• Fuse, 4A, fast-acting, 250V, 5 x 2	2	
36	334805	Filter, line, RFI, power, 10A	2	B
NS	900740	TUBING, polyurethane, 10/6.5−7 mm	AR	
NS	226690	TUBING, polyurethane, 12/8mm, blue	AR	
NS	240976	CLAMP, ground, with wire	1	

NOTE: A. Not used in auxiliary console.

B. One line filter used in auxiliary console.

AR: As Required

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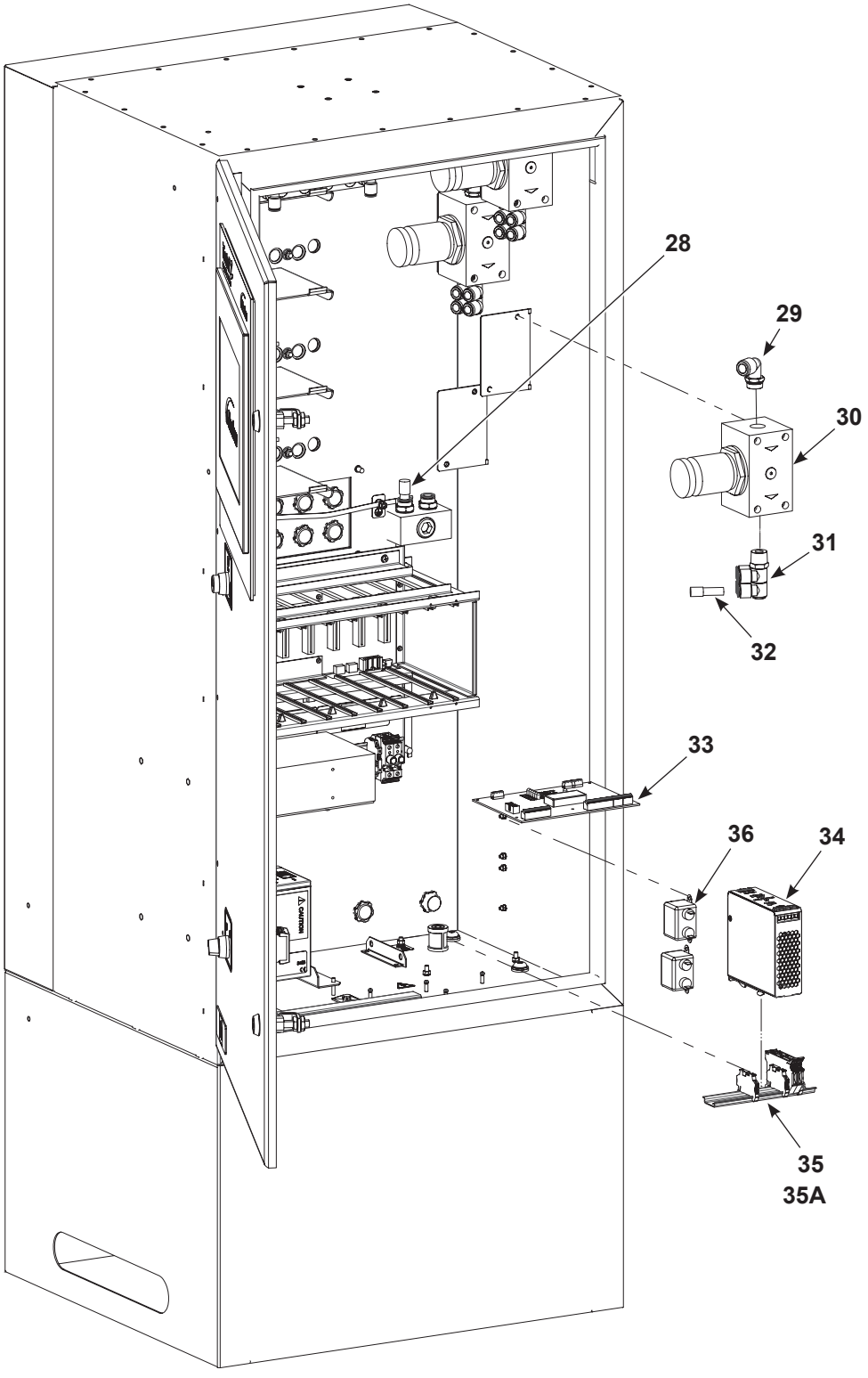


Figure 1-3 Main and Auxiliary Console Parts − Internal Components (3 of 3)

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Pedestal Parts

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

Item	Part	Description	Quantity	Note
1	1608095	Kit, iControl 2, display, touch screen w/ cable	1	A
2	1000594	Switch, keylock, 3-position	1	
3	1000595	Contact block, 1-N.O. And 1-N.C. contact	1	
4	1602873	Assembly, module, digital input, iControl 2 pedestal	1	
5	1602967	Terminal block, pedestal, iControl 2	1	
6	------	CPU, Arbor, iControl 2, Rev 2	1	B
6A	------	Memory, programmed, iControl	1	
6B	1034281	Memory, compact flash (blank, for user data)	1	

NOTE: A. Both the long and short power cable harnesses are provided in the kit. Use the short power cable harness for pedestal installations.

B. When replacing Arbor PC, order kit 1612971, which includes a Rev 2 Arbor PC and new programmed CompactFlash.

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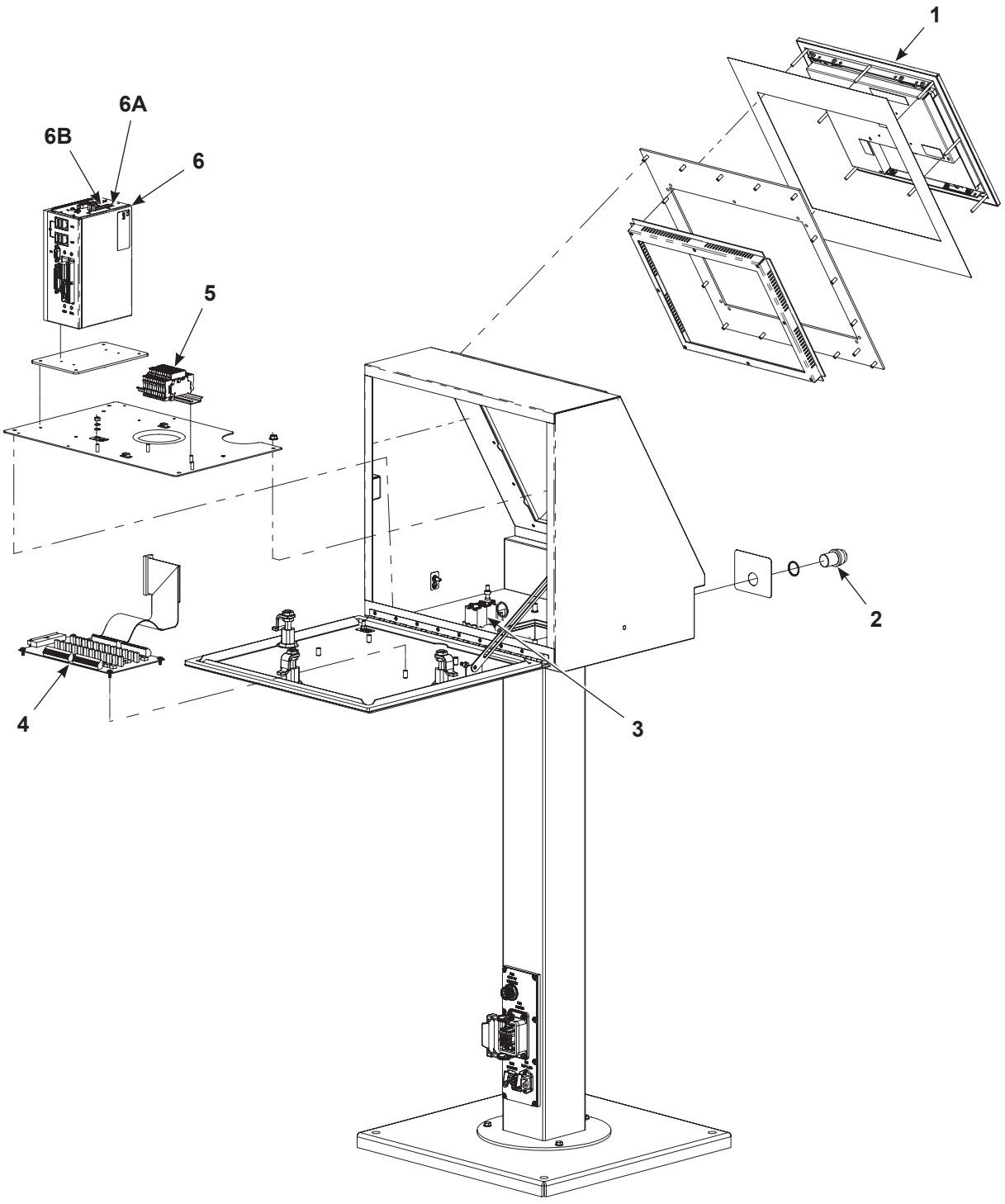


Figure 1-4 Pedestal Parts

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iFlow Module Parts

See Figure 6-5.

Item	Part	Description	Quantity	Note
−	1036657	Module, digital airflow control	1	
1	1099302	• Valve, solenoid, 3-way, w/connector	2	A
2	972125	• Elbow, male, 10 mm tube x 1/4 in. unithread	2	
3	1030873	• Valve, check, M8T x R1/8, M input	4	
4	1033171	• Connector, orifice, 4mm x R1/8, dia 0.4mm	2	
5	1027547	• Valve, proportional, solenoid, sub-base	4	
NOTE: A. The iFlow module can use one of two circuit board part numbers: If using board 1023932, order solenoid valve 1099302. If using board 1099635, order solenoid valve 1099288.				

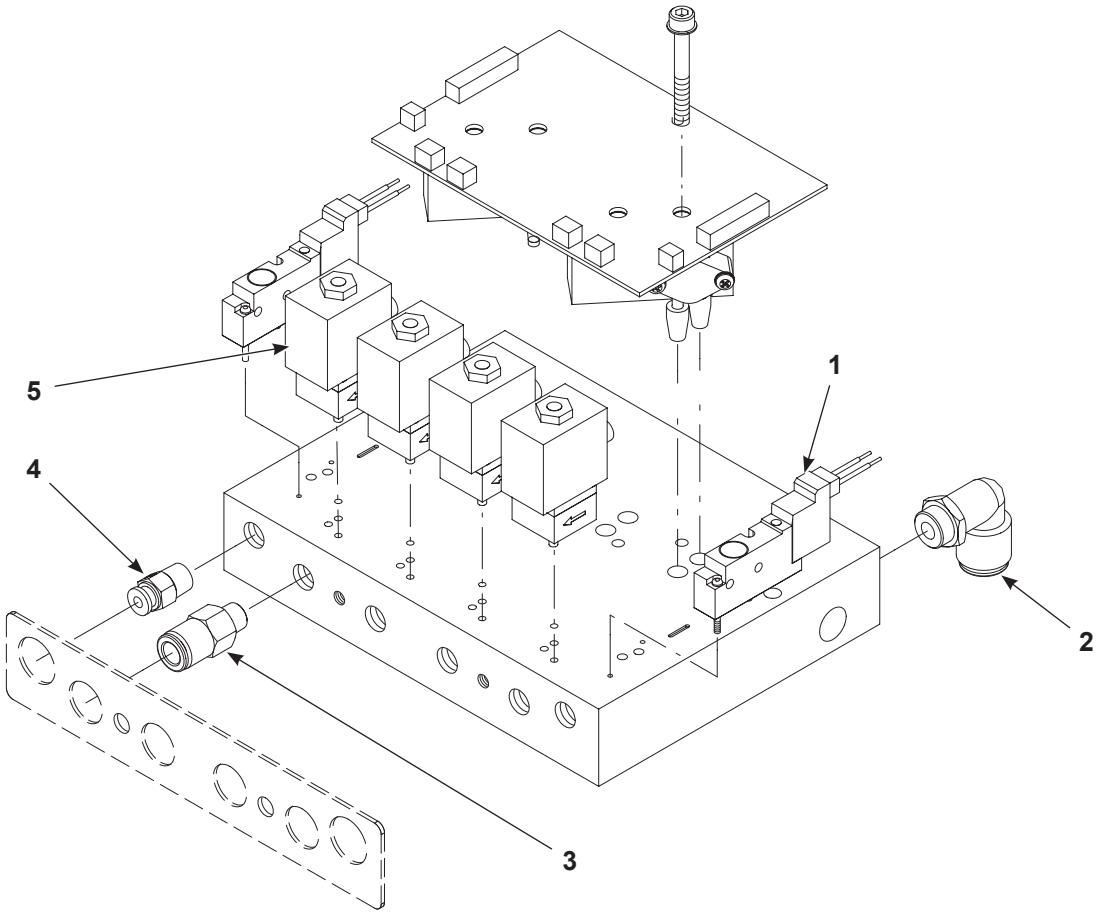


Figure 1-5 Flow Module Parts

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Options

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)	
1603093	Kit, air conditioner, iControl 2	

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	A
321159	Controller, discrete, mini-array	A
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	
321162	Sensor, light emitter, 12 in., 3/4 in.beam spacing, 16 beam	
321163	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	
321165	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	
339743	Sensor, light emitter, 36 in., 3/4 in. beam spacing, 48 beam	
339744	Sensor, light receiver, 36 in., 3/4 in. beam spacing, 48 beam	
339745	Sensor, light emitter, 42 in., 3/4 in. beam spacing, 56 beam	
339746	Sensor, light receiver, 42 in., 3/4 in. beam spacing, 56 beam	
339747	Sensor, light emitter, 48 in., 3/4 in. beam spacing, 64 beam	
339748	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	
NOTE: A. Requires custom programming to match the application. Contact Nordson customer support.		

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Photocell and Scanner Cables

Part	Description	Note
−−−−−−	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	

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Section 1
Drawings

Refer to the following foldout wiring diagrams and schematics for the main and auxiliary consoles.

NOTE: Visit Nordson eManuals for a high resolution view of the wiring diagrams and schematics. Go to http://emanuals.nordson.com for electronic version of the manual for *Encore iControl 2 Integrated Control System* manual.

Number	Description
10012143	iControl 2 Wiring Diagram
10012175	iControl 2 System Schematic
10012144	iControl 2 Auxiliary Wiring Diagram
10012176	iControl 2 Auxiliary System Schematic
10012145	iControl 2 with Pedestal Wiring Diagram
10012146	iControl 2 Pedestal Wiring Diagram
10012177	iControl 2 with Pedestal System Schematic

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