Expanded Plug-and-Play Part ID System

Customer Product Manual

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For parts and technical support, call the Industrial Coating Systems Customer Support Center at (800) 433-9319 or contact your local Nordson representative.

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Change Record

Revision	Date	Change
01	06/14	Initial release.
02	04/16	Incorporated Modbus with the part ID system.
03	03/23	Corrections for beam spacing, installation instructions, and beam arrays information.
04	09/23	Added 2 list lines and changed descriptions to remove sales order

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.

Personal Safety

To prevent injury follow these instructions.

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

High-Pressure Fluids

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

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

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

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

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

MEDICAL ALERT — AIRLESS SPRAY WOUNDS: NOTE TO PHYSICIAN

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

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

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

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Ground all conductive equipment. 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.

Halogenated Hydrocarbon Solvent Hazards

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

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

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

Action in the Event of a Malfunction

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

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

Disposal

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

Description

The part ID system provides dimensional data about parts to be coated in a spray triggering system. The system detects part location and part shape dimensions to the controls of the automated powder spray system. The data transmitted communicates through the junction box to the system controls. The system will then automatically adjust 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 photoeyes)
- Junction box (includes part ID electronics)

The information produced by the junction box is used to direct the function of spray guns in a spray booth. 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. The junction box can also be configured to monitor the line continuously and to read part ID flags.
3. An iControl (or similar system), with a conveyor encoder, uses information from the junction box to direct the location and state of spray guns ensuring the part is properly coated.

Features

Junction Box

The Nordson junction box provides an interface between the part identification (ID) system and the spray gun triggering system for the spray booth. All junction boxes include a 24 Vdc power supply to provide power to the circuit boards and sensors and can be used with or without an iControl system. The junction boxes are available in three configurations to use with beam array or with photoeye sensors.

1. Photoeye sensors − model for use with photoeyes. The junction box provides a 24 Vdc power source and a connection to photoeye sensors only. This configuration is used on iControl and other OEM triggering systems using photoeyes.
2. Expanded plug-and-play beam array − model for use with beam array sensors. This configuration is used with Nordson and other OEM gun triggering controllers, it includes the part ID main board with an output expansion board attached to provide digital and analog signals for vertical zone data, analog signals for horizontal zone data, and digital preset data. The beam spacing is 19.1 mm (3/4 in.).
3. Beam arrays with iControl − model for use with beam array sensors. This configuration provides a Modbus TCP connection for use with the Nordson iControl. A custom PLC can also be used with this junction box and would connect via the Modbus TCP connection.

NOTE: This manual covers photoeye sensors and expanded plug-and-play beam array. iControl is not discussed in this manual.

Junction Box Specifications	
Voltage	100-240 Vac, 50/60 Hz, 1 phase, 50 VA
Current	1.5 A (max)
Dimensions	12 in. x 14 in. x 6 in. (304.8 mm x 355.6 mm x 152.4 mm)
Compliance	CE

Junction Box Configurations

The DC power supply has a green LED that will be on when the power supply is receiving power.

Refer to Figure 1 for the items that may be installed in the junction box.

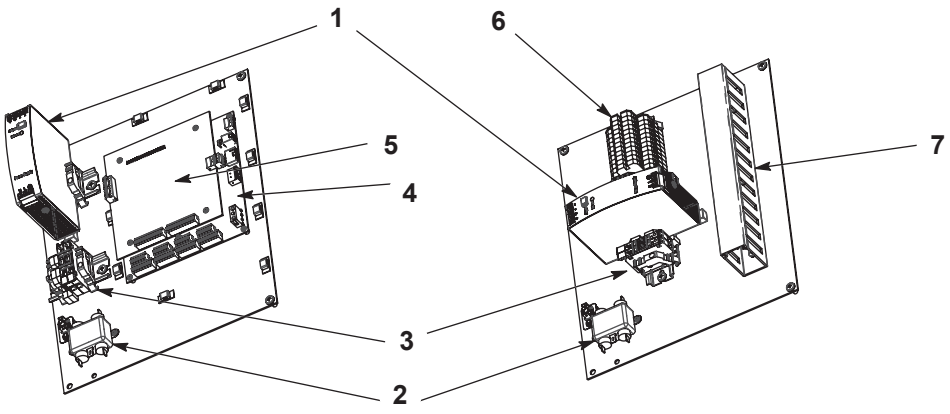


Figure 1 Junction Box Options

1. Power supply
2. Input filter
3. Fuses
4. Part Id main board
5. Output expansion board (for expanded plug-and-play version)
6. Terminal block
7. Wire duct

Part ID Stand

See Figure 2.

The part ID stand is used to mount the junction box and sensors. The stand is available in two varieties, one to run the conveyor through the stand and the other above the stand. Among the two varieties, the part ID stand is available in several configurations and sizes for various booth openings and conveyor placements.

The part ID stand is available in several configurations and sizes for various booth openings and conveyor placements.

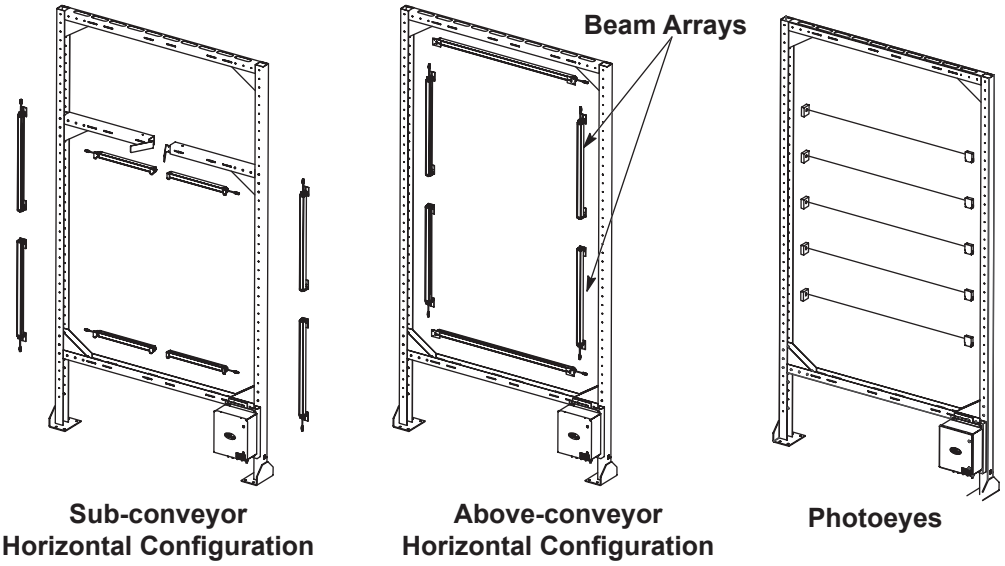


Figure 2 Junction Box with Part ID Stand and Arrays

Part ID Main Board

The part ID main board has a processor which connects to the light curtains via an RS-485 network. This board can also communicate with Nordson's iControl system or a custom PLC via Modbus TCP. Spray triggering systems using beam arrays without the Modbus protocol require the output expansion board.

A DIP switch on the part ID main board is set to indicate that the output expansion board is attached. Refer to the Configure Circuit Boards section for setup instructions.

Part ID Main Board LEDs and Switches

Refer to Table 1 and see Figure 3.

Board LEDs indicate the status of the hardware and the system configuration. There are two diagnostic LEDs on the part ID main board that flash the software version at startup.

- DIAG 1 LED
- DIAG 2 LED

See Table 2 for the meaning of the LED states.

See Table 3 for an example of how to convert the signals into a series.

Table 1 Part ID Main Board

Part ID	Description
DIAG 1 and DIAG 2	Diagnostic LEDs that flash the software code version upon startup
	Refer to Table 2
PART ID LEDs	Turn on when the corresponding part ID beam is broken
	Show the configured curtains light upon startup
	See Figure 4
Zone LEDs	Turn on when the corresponding zone beam is broken
	Show the number of configured zones upon startup
Heartbeat LED	Blinks at 2 Hz when the microprocessor is running
BCD Switch	Discrete mode: positions 1-8 set the number of zones
	Position 0 disables the RS-485
	When connected to an iControl, positions 1-8 set the last digit of the IP address when configured for static IP as well as setting the default number of zones
DIP Switches	Identify the hardware configuration of the junction box
Programming Port	Programs the EEPROM using EZ Ladder
Micro SD Input	Reprograms the EEPROM
DC Power Input	Provides 24 Vdc to the board and sensors
Ethernet Connection	Modbus TCP connected to be used with iControl or custom PLC
Modbus/CAN Jumper	Selected to use Modbus TCP or CAN (not currently implemented)

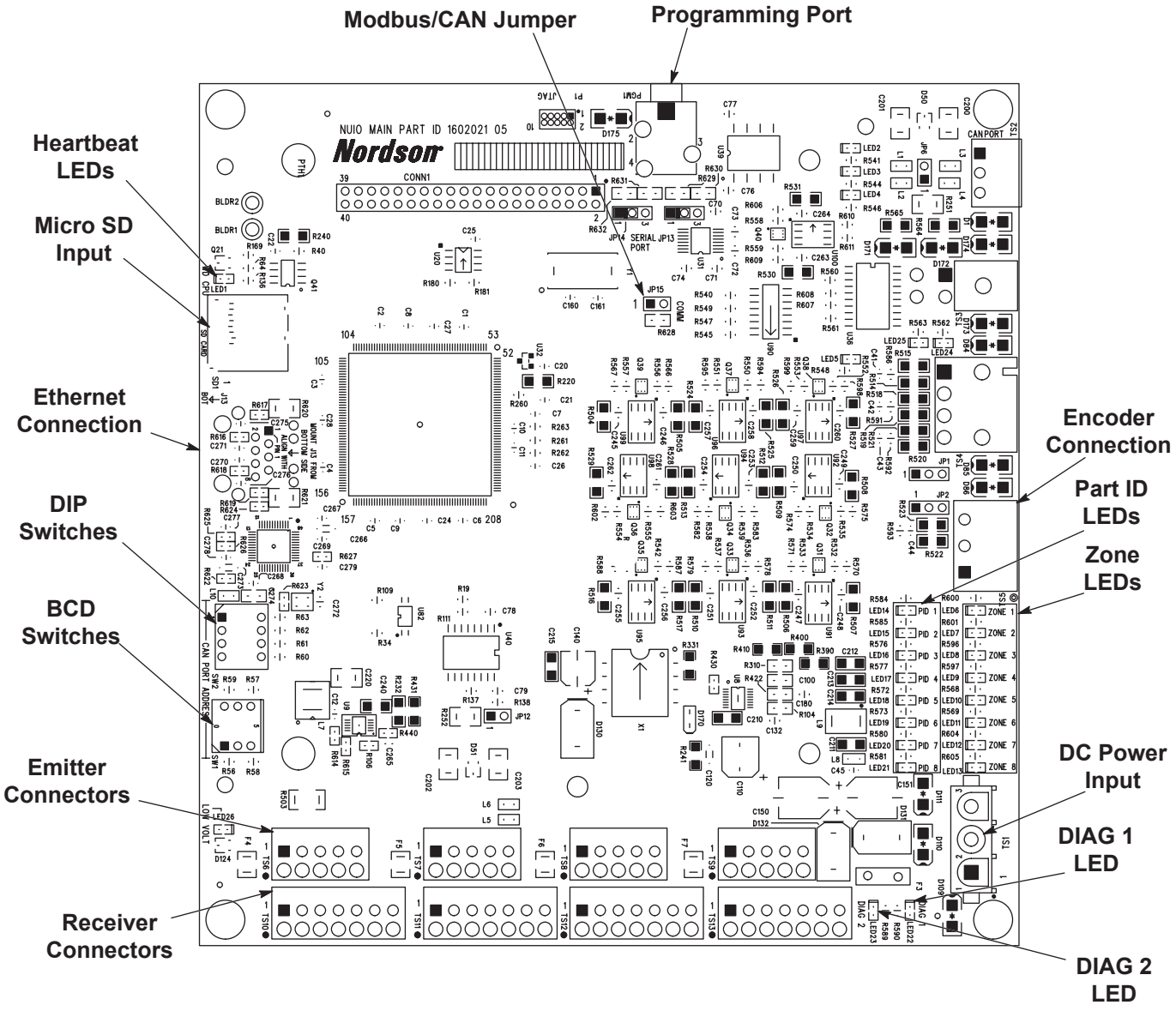


Figure 3 Part ID Main Board

Reading the Diagnostic LEDs

The tables below provide the meanings of the diagnostic LED flashing sequence. The LEDs are only used to read the software version at startup. After startup, the LEDs remain off.

After the version has been displayed and if the board is not initialized, both LEDs will flash on for three seconds and off for three seconds. After configuration is complete, the LEDs will turn off and remain off.

Table 2 Part ID Main Board

LED 0	LED 1	Meaning
ON	ON	1
ON	OFF	0
OFF	OFF	.

Table 3 Software Version Example

LED 0	LED 1	Meaning	Total
ON	ON	1	1
OFF	OFF	.	1.
ON	OFF	0	1.0
OFF	OFF	.	1.0.
ON	OFF	0	1.0.0
OFF	OFF	.	1.0.0.
ON	ON	1	1.0.0.1
OFF	OFF	.	1.0.0.1.

Zone LEDS

See Figure 3.

The part ID main board includes LEDs for zones 1−8. During normal operation, the corresponding zone LED will be lit when a zone is detected to have beams broken. These LEDs will be lit during startup to show the number of zones. The LEDs represent the BCD switch zone number setting or, if it has been programmed through the software, it shows the programmed number of zones.

Part ID LEDs

See Figure 4.

The part ID main board includes LEDs for part ID. During normal operation, the part ID LEDs will follow the states of the flagging light curtain. These LEDs will be lit during startup, indicating the configured light curtains.

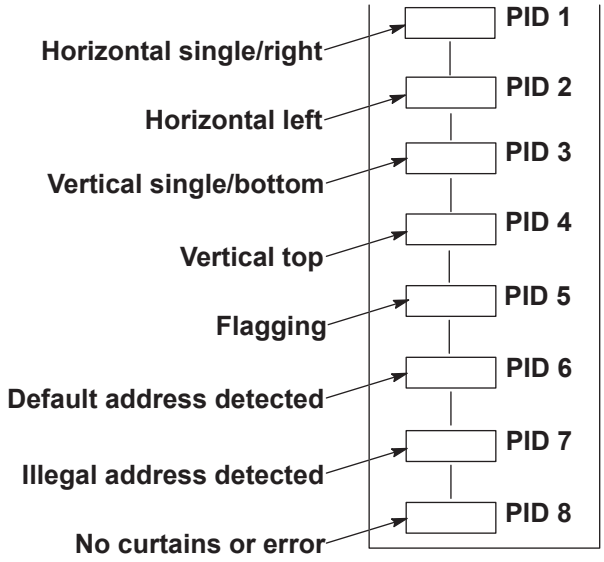


Figure 4 Part ID LEDs

Output Expansion Board

See Figure 5 and refer to Table 4.

The output expansion board contains analog and digital outputs that enable the part ID main board to communicate to a variety of spray gun control systems. There are 16 digital and 4 analog outputs. Eight digital outputs are used for light curtain zones, eight are used for part ID programming, and the analog outputs are used for two horizontal and two vertical measurements. There are also 16 LEDs on the board that indicate zone and part ID status.

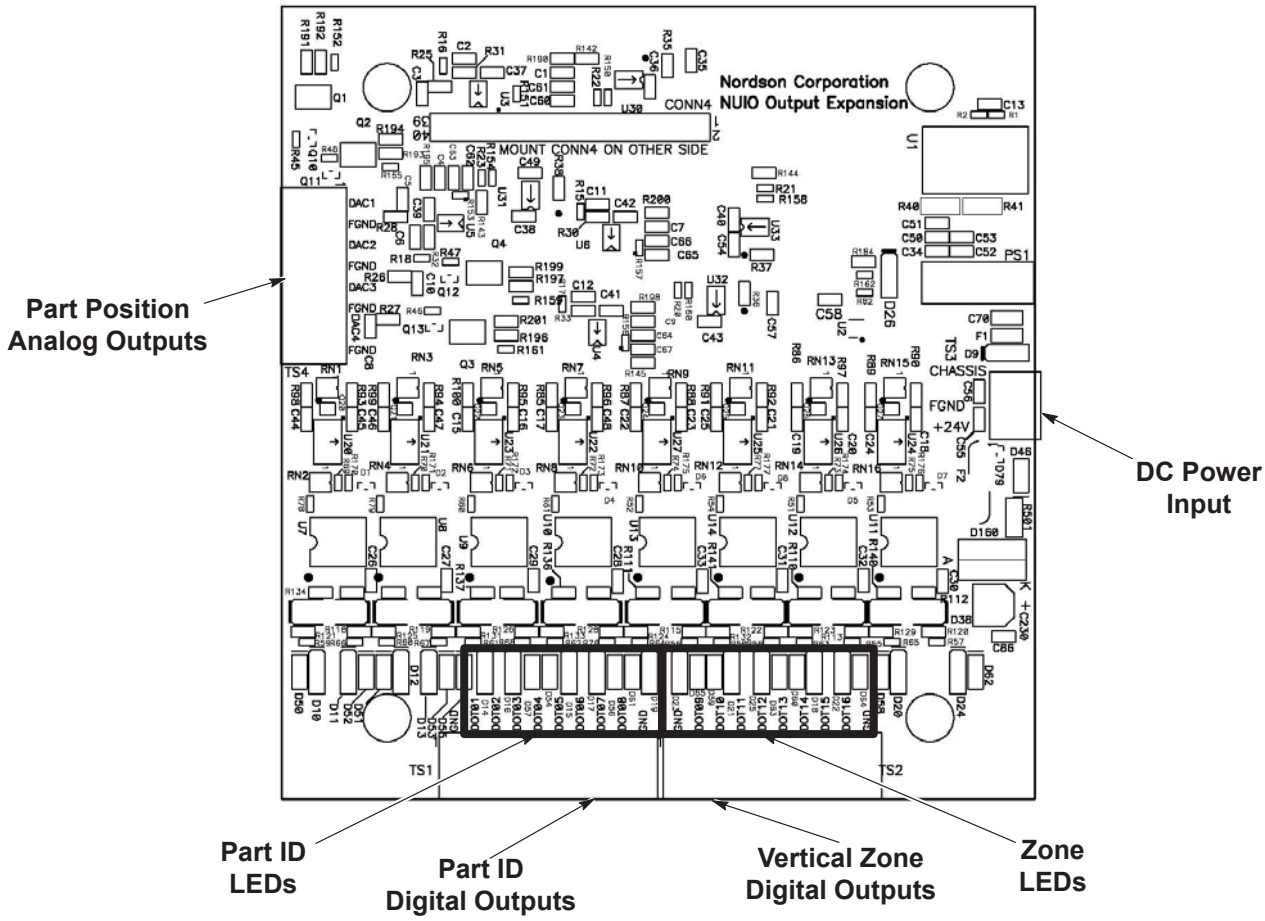


Figure 5 Output Expansion Board

Table 4 Part ID Main Board

Part ID	Description
Part Position Analog Outputs	Four analog outputs provide voltages based on vertical and horizontal first and last beams broken (FBB/LBB) in the curtain
Part ID LEDs	Turn on when the corresponding part ID beam is broken
	Show the configured curtains light upon startup
Part ID Digital Outputs	Provide flagging information based on part ID
Vertical Zone Digital Outputs	Provide vertical part shape data for the eight vertical zones
Zone LEDs	Turn on when the corresponding zone beam is broken
	Show the number of zones configured on startup
DC Power Input	24 Vdc from the junction box power supply

Installation

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

This section provides installation instructions. Installation includes mounting, wiring, and configuring the part ID stand, sensors, and junction box.

Assemble Part ID Stand and Sensors

See Figure 6.

Junction box and Beam Arrays Assembly

NOTE: See Figure 6. Beam array cables require specific routing.

1. Assemble the part ID stand according to the application's requirements.
2. Install the junction box.
   a. Remove the junction box from its packaging and verify that all of the components are present and installed. See Table 5.

Table 5 Junction Box Variations

Sensor Type	Contents
Photoeye	Power supply, terminal strip, wire duct
Expanded Plug-and-Play Beam Array	Power supply, part ID main board, output expansion board
Networked Plug-and-Play Beam Array with iControl	Power supply, part ID main board

   b. Attach the junction box to the lower right corner of the part ID stand using the provided hardware.
   c. Route power cables from the facility's main electrical control panel to the junction box. Follow local electrical code including the use of conduit as required. Connect power to the junction box using the supplied 30- or 50-foot cable.
3. Mounting brackets are pre-installed on the sensors. Mount the sensor assemblies to the part ID stand as required to accommodate the parts that are being coated.

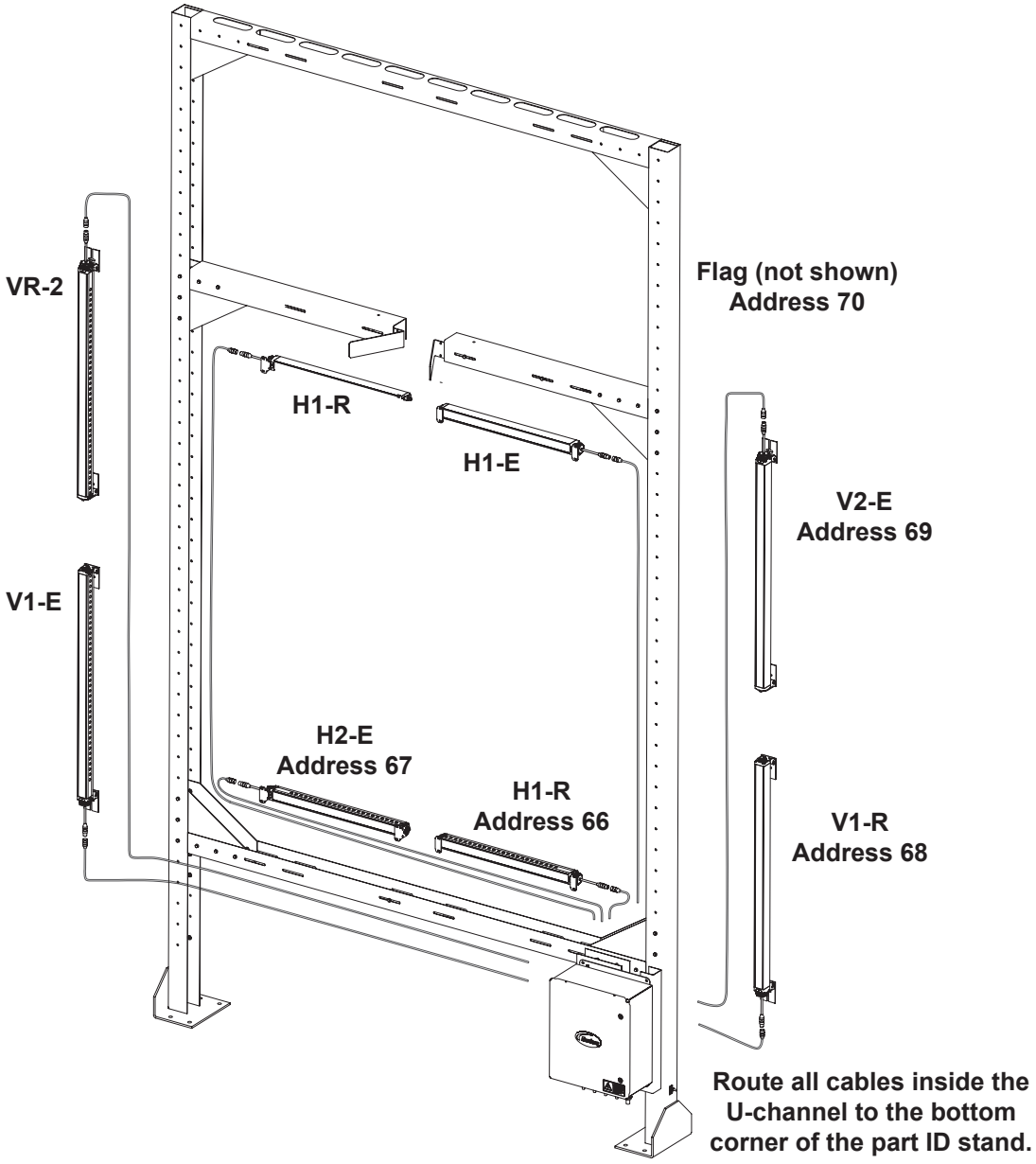


Figure 6 Sensor Location and Cable Routing

Photoeyes

There can be as many as eight photoeyes vertically. Zone 1 is always at the top.

1. Attach the photoeyes to the part ID stand at intervals appropriate for the application. Mount the photoeyes on the same side as the junction box and the reflectors opposite.
2. Apply the labels included with the junction box parts kit to each sensor.
3. Align the reflectors with the photoeyes and attach them to the stand.
4. Route the sensor cables to the junction box through the stand U-channel.

Configure the Junction Box and Sensors

See Figure 7 and Figure 9.

Route the sensor cables through the cord grip plugs in the bottom of the junction box. Note the designators on the box and route the cables appropriately to ease future maintenance.

Connect Beam Arrays

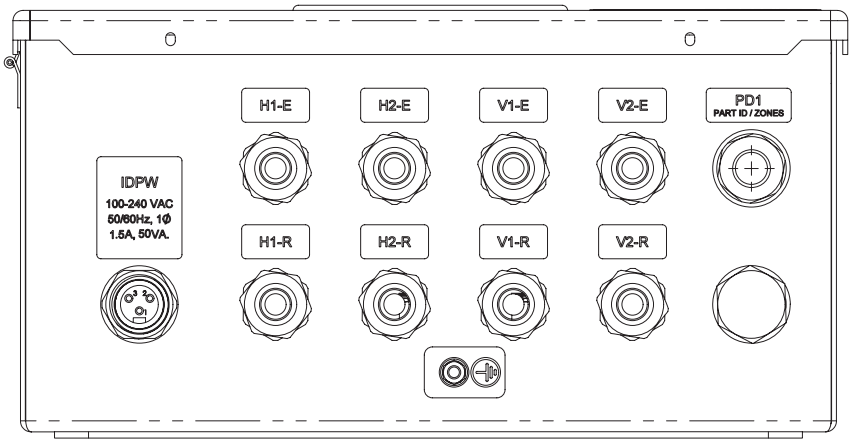


Figure 7 Beam Array Sensor Cable Entrance to Junction Box (outside bottom view)

See Figure 8.

1. Connect the beam array cables to the junction box or proceed to the Connect Photoeyes section.

NOTE: Cable wires are stripped and tinned in the factory. **Do not cut cables to length**.

a. Connect the sensor wires to the terminal strips on the part ID main board.

b. Coil extra sensor cables inside the junction box.

c. Proceed to the Configure Circuit Boards section for additional installation requirements.

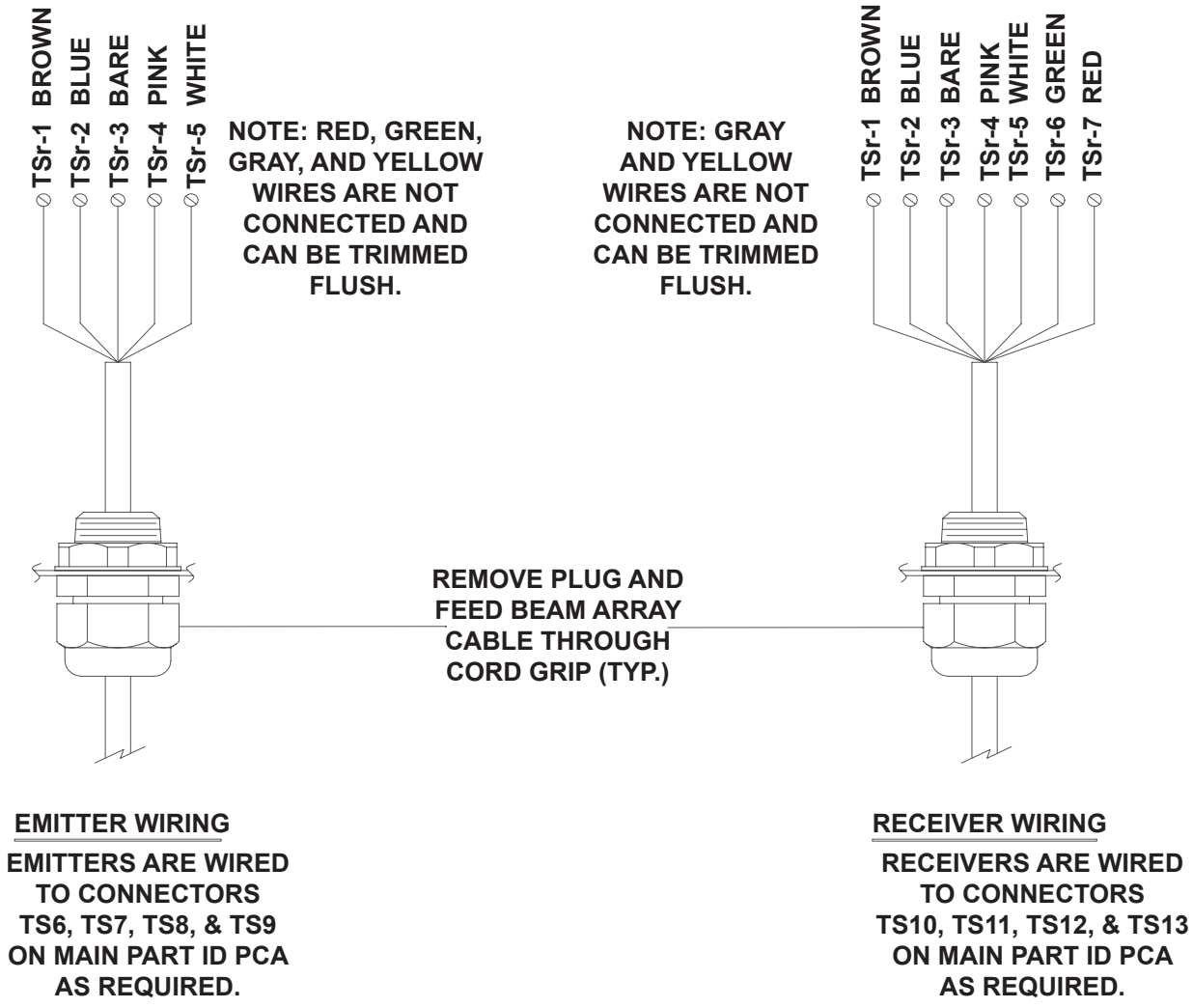


Figure 8 Beam Array Junction Box Wiring

Connect Photoeyes

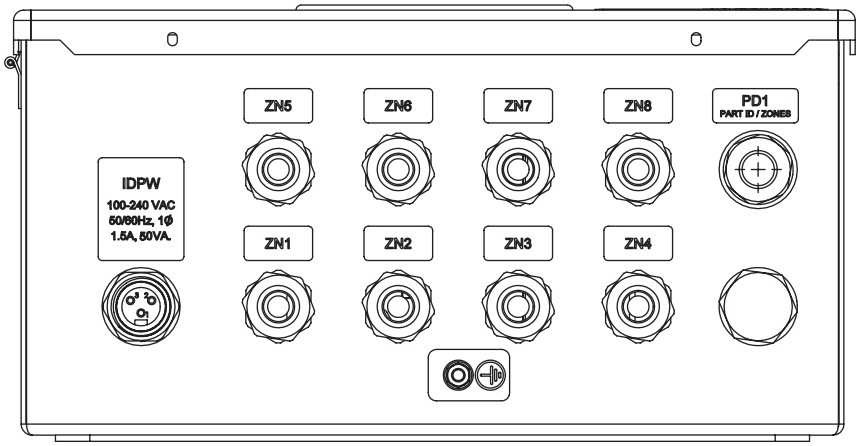


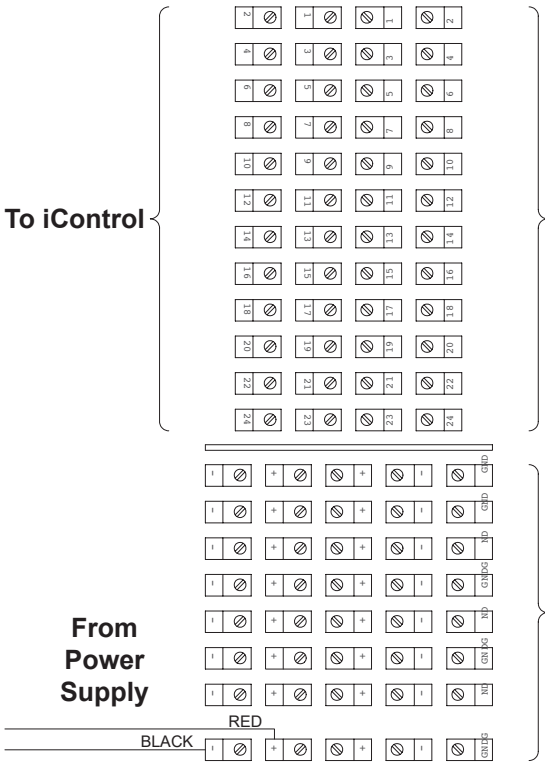
Figure 9 Photoeye Sensor Cable Entrance to Junction Box (outside bottom view)

1. Connect the photoeye cables to the junction box.

   a. Route the photoeye cables to the junction box and through the cord grips. Label accordingly to ease future maintenance.

NOTE: Cable wires are stripped and tinned in the factory. **Do not cut cables to length.**

   b. Terminate the photoeye cables according to the wiring chart in Figure 10.



WIRING CHART: iCONTROL PD1 CABLE

WIRE COLOR	Terminal n	FUNCTION
BLACK	1	ZONE 1
BROWN	2	ZONE 2
RED	3	ZONE 3
ORANGE	4	ZONE 4
YELLOW	5	ZONE 5
GREEN	6	ZONE 6
BLUE	7	ZONE 7
VIOLET	8	ZONE 8
GRAY	9	PART ID 1
WHITE	10	PART ID 2
WHITE/BLACK	11	PART ID 3
WHITE/BROWN	12	PART ID 4
WHITE/RED	13	PART ID 5
WHITE/ORANGE	14	PART ID 6
WHITE/YELLOW	15	PART ID 7
WHITE/GREEN	16	PART ID 8
WHITE/BLUE	17	TRIGGER BANK 0
WHITE/VIOLET	18	TRIGGER BANK 1
WHITE/GRAY	19	TRIGGER SELECT
WHITE/BLACK/BROWN	20	ENCODER A
WHITE/BLACK/ORANGE	21	SPARE
WHITE/BLACK/YELLOW	22	SPARE
WHITE/BLACK/GREEN	23	SPARE
WHITE/BLACK/RED	24	+24 VDC
WHITE/BLACK/BLUE	25	NOT CONNECTED
DRAIN	GND STUD	SHIELDING

Figure 10 iControl Photoeye Junction Box Wiring

Configure Circuit Boards

Configure the part ID main board and output expansion boards for use with beam array or photoeye sensors. EZ Ladder or equivalent software can be used to customize the junction box. For complete programming instructions, guidance is provided in Appendix 1: Configuration Using EZ Ladder of this manual. Contact a Nordson representative to customize installation.

Hardware Setup

See Figure 3.

1. Set the part ID main board DIP switches for the installation using Table 6.

NOTE: *Off* refers to the switch being open, and *On* refers to the switch being closed.

Table 6 DIP Switch Settings

Switch	Function	Factory Setting
1	Off: iControl (remote)	On
	On: discrete	
2	Off: no output expansion board	On
	On: output expansion board installed	
3	Off: DHCP	Off
	On: static IP (192.162.1.X)	
4	Off: no effect	Off
	On: erase EEPROM	

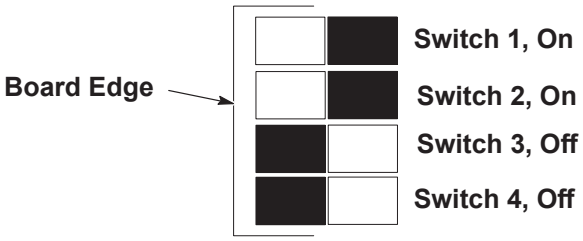


Figure 11 DIP Switch Setting

NOTE: The part ID main board has a BCD switch located next to the DIP switches.

- Configured for expanded plug-and-play mode: setting this switch to 0 disables the RS-485 Bus for expanded plug-and-play mode. Positions 1−8 set the number of vertical zones used in the system. Verify this switch is set to the correct number of zones for the installation.

Software Setup

When power is first applied, the part ID main board performs a startup routine. As part of this routine, the microprocessor checks whether or not it should auto-configure the board.

Auto-configure occurs if all of the following are true.

- EEPROM is blank
- At least one vertical light curtain is found with an address of 68 (single or bottom)
- No more than five light curtains are found
- All light curtains are addressed between 66 and 70

NOTE: If the system boots with a blank EEPROM and does not detect a valid light curtain setup, the system will not automatically configure. LEDs DIAG 1 and DIAG 2 will flash on and off. Setting the BCD switch to 0 will also cause DIAG 1/DIAG 2 to flash.

Auto-configure the following information to the EEPROM.

- Number of zones set on the BCD switch
- Addresses of detected light curtains
- Light curtain types set to 1, normal scan
- Zone size, set by dividing the number of zones into the number of beams
- Analog calibration values for 0 V = 0.0
- Analog calibration values for 10 V = 93.5
- Vertical gap, set to 1 in. between two vertical curtains if two are present

After the EEPROM is configured, the system goes online and begins monitoring the sensors and sending information to the gun control system.

NOTE: On future starts, the system will not auto-configure because the EEPROM is not blank. The system will initialize, begin monitoring the light curtain, and communicate with the spray gun controller. Changing the number of zones via the BCD switch will not change the actual number of zones once the part ID main board has booted and auto-configured.

Force Software Auto-Configure

To clear the EEPROM and force the system to auto-configure,

1. Shut down the system.
2. Set DIP switch 4 to *On*.
3. Energize the system for 10 seconds.
4. Turn power off.
5. Set DIP switch to *Off*.
6. Restart the system.

NOTE: EZ Ladder software can be used to update or customize the configuration. Contact a Nordson representative for more information.

Beam Alignment

After the system has been energized, the installer must align the beams.

1. Loosen the bolts that hold the slotted steel base of the receivers to the part ID stand. The beam receivers have LEDs on them that indicate whether or not they are receiving the emitter signal.
2. Apply power to the junction box.
3. Check that the beam array emitters are parallel to the frame and securely fastened. The red LED should be on.
4. Beginning with the receiver at one end, verify that it is the same distance from the perpendicular cross-member as the emitter.
5. The receiver LEDs will be red, yellow, or green depending on the alignment of the receiver with the emitter. Loosen the beam array receiver and adjust it until only the green LED at the cord end of the array is illuminated.
6. Tighten the beam array receiver mounting bolts.
7. Repeat steps 4 and 5 for all beam array receivers.
8. When complete, verify the following information.

- Red LED is on each beam array emitter
- Green LED is on each beam array receiver
- Part ID and zone LEDs on part ID main board are off, indicating that no beams are broken
- Part ID and zone LEDs on output expansion board are off, indicating that no beams are broken
- Using a hand or a tool, break each beam or zone and verify that the corresponding LED on the part ID main board and output expansion board turns on

Horizontal Beam Blanking Procedure for Above−Conveyor Model

For complete installation procedures, contact a Nordson representative for assistance.

Beam Array Calibration

The analog outputs on the output expansion board must be calibrated. Four values are calibrated: first and last beams broken (FBB/LBB) in the horizontal and vertical axes.

NOTE: The part ID main board is shipped from the factory with default calibration values programmed for the sensors used. If problems are encountered, use this procedure to calibrate the sensors.

Beam Array Calibration Tools

- EZ Ladder installed on a computer
- Volt meter (DVM)
- Communication cable (USB to RS-232 to audio jack)

Since the output expansion board will be used on systems which do not have access to the Modbus network, it will be necessary for the field adjustment of these placeholders to use EZ Ladder software and a DVM. It is expected that a field engineer would modify the EZ Ladder application running on the part ID main board by modifying one variable value at a time.

1. Connect the computer running EZ Ladder to the junction box using the communication cable.
2. Monitor Analog Output Voltage #1 (Horizontal FBB) with a DVM and adjust the value (variable #1) in EZ Ladder until the DVM reads 0.0 Vdc.
3. See Table 7. Physically break the last light beams and adjust the analog output voltage #1 (via variable #2) until the DVM reads 10.0 Vdc. Position will determine whether you break the first or last beam on the beam array.

Table 7 Adjustment Sequence

Number	Function
1	Horizontal first beam broken (HFBB)
2	Horizontal last beam broken (HLBB)
3	Vertical first beam broken (VFBB)
4	Vertical last beam broken (VLBB)

4. The PWM output for analog channel #1 will have values of 0.0 for 0.0 Vdc and 93.5 for 10.0 Vdc stored in its variable placeholders. The application will scale all FBB outputs between these two PWM values to produce the desired 0 to 10 Vdc output.

Configuring Zones

The light curtain can be divided up into eight vertical zones. Vertical zones can be customized using EZ Ladder software. If additional information is required, contact a Nordson representative for assistance.

Vertical Zones

The vertical axis is monitored through a two-channel analog output and has up to eight digital outputs. The vertical zones are set using the 10-position BCD switch on the part ID main board. Zones set using the switch are automatically set to equal size by the microprocessor during configuration. The zones can be set to custom size and location using EZ Ladder. The two methods of setting zones produce different results. Table 8 provides an explanation of the differences.

Analog outputs return a voltage between 0 and 10 Vdc. First beam broken (FBB) is found nearest the cable (or bottom in a dual/vertical setup), while last beam broken (LBB) is on the opposite end. When two beam arrays are used in either axis, the result is scaled to produce a value between 0 and 10 Vdc across both arrays.

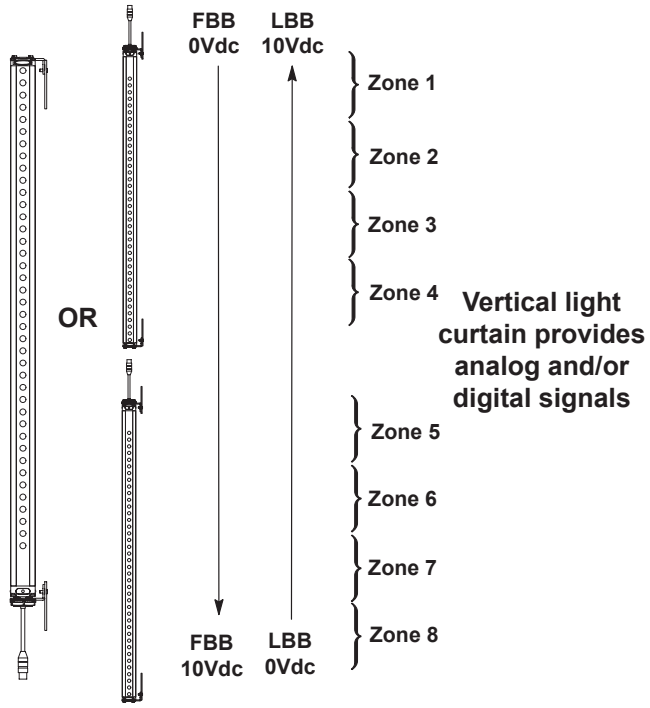


Figure 12 Vertical Beam Array Configuration

Table 8 Digital Zone Configuration Differences

Parameter	BCD Switch	Programmed
Maximum number of zones	8	8
Zone size and shape	Zone are equal size and spaced sequentially without overlap. Refer to Zones 1-8 in Figure 12. When the number of zones does not divide evenly into the number of beams, each zone is rounded. Less than 0.5 remainder is rounded down, and 0.5 and above is rounded up.	Each zone can be configured to include number of beams
Initialization of zones	The BCD zone switch is read when the board is initialized (EEPROM blank) and the zone information is written to EEPROM.	The zones are read from the software stored on the EEPROM.

Horizontal Outputs

The horizontal axis can use one or two beam arrays. The part ID main board sends two outputs. When one array is used, it detects first and last beam broken (FBB/LBB). When two arrays are used, FBB is used for each array. First beam is nearest the cord, or outside edges of the horizontal light curtain. A part the full width of the light curtain would return 10 Vdc for the left and 10 Vdc for the right dimensions. The FBB and LBB voltages may need to be calibrated during installation. Refer to the Beam Array Calibration procedure.

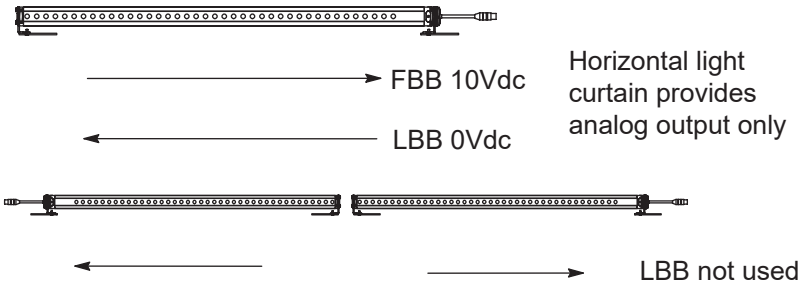


Figure 13 Horizontal Beam Array Configuration

Repair

If the part ID system fails, refer to the Troubleshooting section for help in identifying the issue. After the problem has been diagnosed, use this section to remove and replace components.

Repairing the Junction Box

Installing Software

This section explains the various ways to load software into the part ID main board. Load software if you suspect that the original software has become corrupted or if there is an upgrade.

Micro SD Card

Refer to Table 9.

1. Turn off power to the junction box.
2. Insert a micro SD card containing the software into the micro SD slot on the main board.
3. Turn on power to the junction box.
4. Wait 10 seconds.
5. Turn off power to the junction box and remove the micro SD card.
6. Turn on the junction box.
7. Record the DIAG 1 and DIAG 2 LED signals and verify that the correct software version has been installed.

Programming Port

Refer to Table 9.

1. Turn off power to the junction box.
2. Connect a computer to the part ID main board using an audio−to−RS-232 adapter connected to an RS-232−to−USB adapter.
3. Turn on power to the junction box.
4. Start EZ Ladder or equivalent program.
5. Write the software package to the board.
6. Disconnect the computer and cycle power to the junction box.
7. Record the DIAG 1 and DIAG 2 LED signals and verify that the correct software version has been installed.

Table 9 Software Version Example

LED 0	LED 1	Meaning	Total
ON	ON	1	1
OFF	OFF	.	1.
ON	OFF	0	1.0
OFF	OFF	.	1.0.
ON	OFF	0	1.0.0
OFF	OFF	.	1.0.0.
ON	ON	1	1.0.0.1
OFF	OFF	.	1.0.0.1.

Repairing the Part ID Stand

If the part ID stand is damaged, contact a Nordson representative for assistance ordering and installing new parts.

Replacing the Beam Arrays

Refer to Appendix 1: Configuration Using EZ Ladder.

Beam arrays are pre-addressed. Be sure to order the correct replacement array. They can also be assigned addresses on site with EZ ladder software.

1. Turn off power to the junction box.
2. Remove the failed beam array by removing the nut, washer, and bolt from the beam array brackets at each end.
3. Slide the beam array out of the stand, disconnecting the cable.
4. Verify that the new beam array is the correct part number for the location being replaced. Refer to the Parts section.
5. Transfer the brackets to the new beam array.
6. Secure the beam array into the stand with the nut and screw on each end.
7. Apply power to the junction box.
8. Remove the beam arrays and mounting hardware from their packaging.

NOTE: Beam arrays are addressed at the factory. They must be installed according to Table 10 and Figure 14. Refer to the Parts section for part numbers. Contact a Nordson representative to reprogram a beam array address.

Table 10 Beam Array Addresses

Array Number	Location	Address
HR-1	Horizontal single or right	66 (0x42)
H2-R	Horizontal left	67 (0x43)
V1-R	Vertical single or bottom	68 (0x44)
V2-R	Vertical top	69 (0x45)
Flag	Variable	70 (0x46)

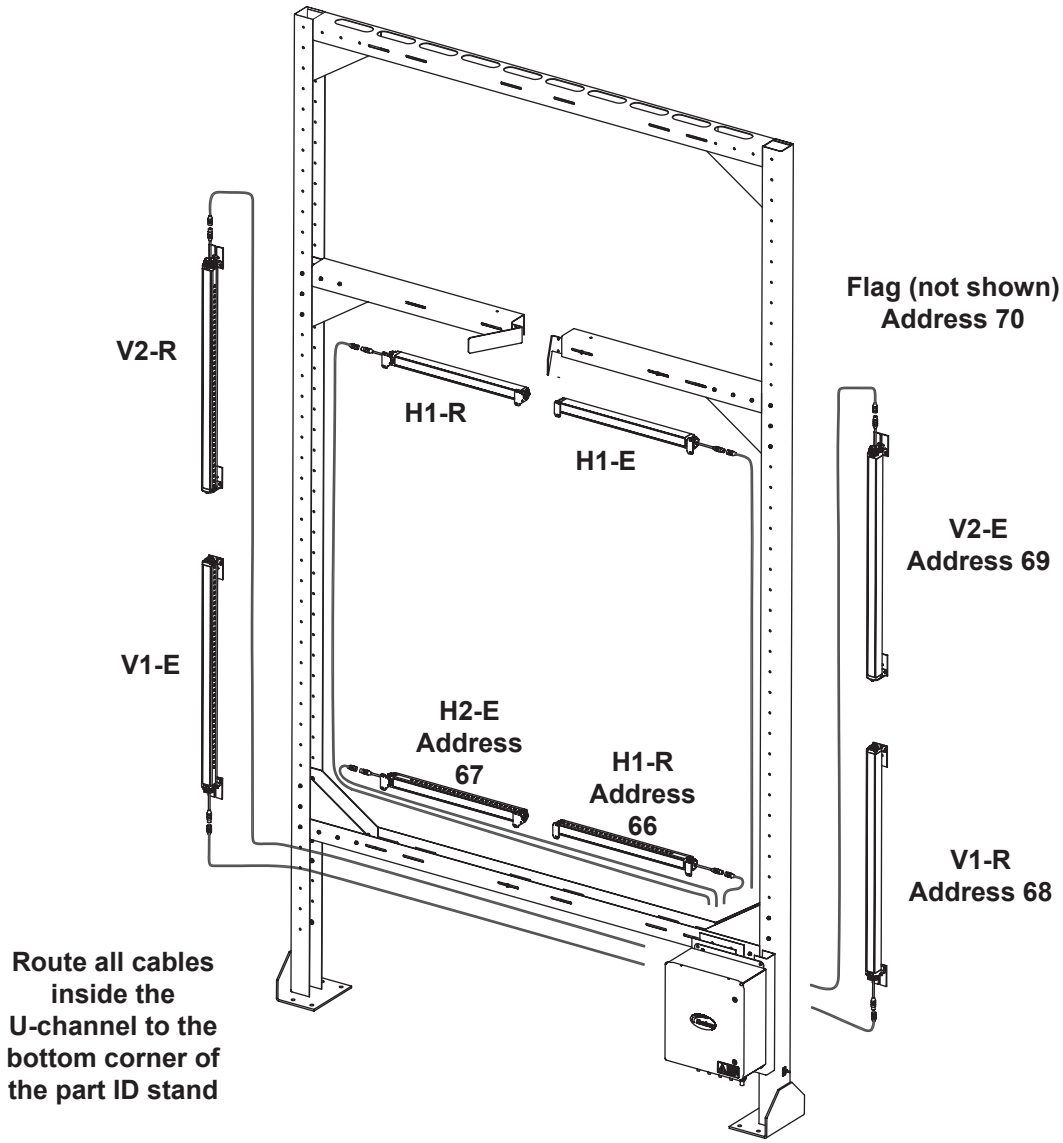


Figure 14 Sensor Location and Cable Routing

9. Attach the mounting brackets to the beam arrays and orient according to Figure 15. Position brackets for receivers and emitters 180 degrees apart in a parallel orientation to allow for proper alignment.

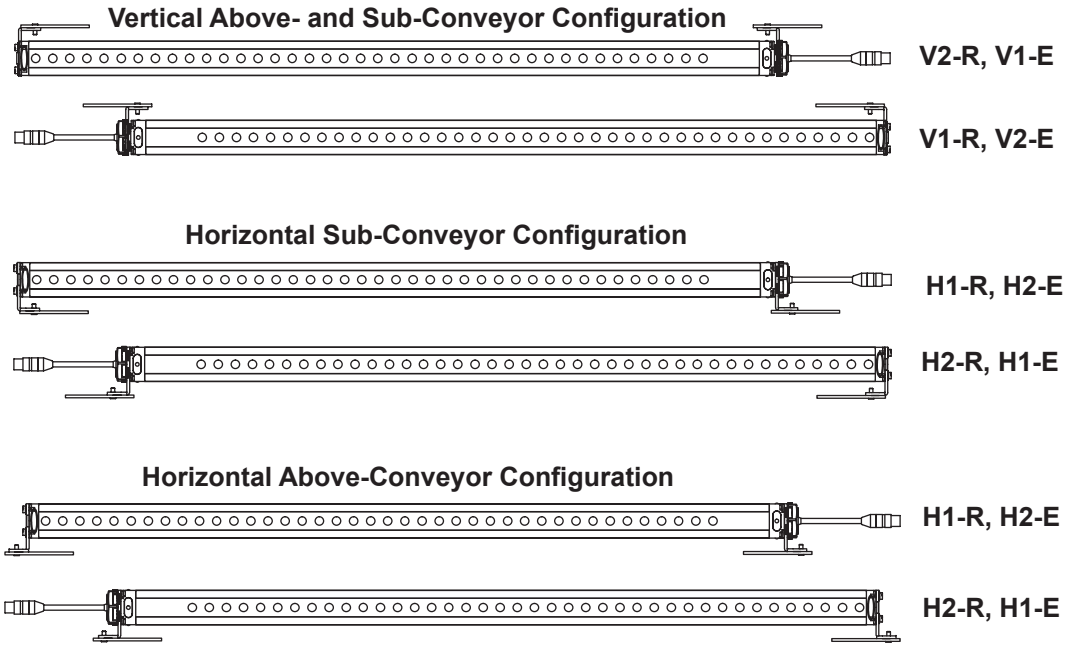


Figure 15 Beam Array Bracket Orientation

10. See Figure 14. Install the beam arrays in the part ID stand.
    a. Align the beam array mounting brackets with the slots in the part ID stand and fasten with bolts and nuts. Align the emitters so that they are parallel to the stand and tighten the mounting hardware. Lightly tighten the receiver hardware.
    b. Connect the cables to the beam arrays.
    c. Apply labels included with the junction box parts kit to each cable.
    d. Route cables loosely in the stand U-channel until beam alignment is complete.
    e. Route all cables to the lower right corner of the part ID stand and out the bottom.
    f. Proceed to the Configure the Junction Box and Sensors section for additional installation requirements.
11. Verify that the new beam array is aligned by checking the beam array LEDs. If alignment is needed, refer to the Beam Alignment procedure.

Replacing the Photoeyes

Photoeyes are installed individually.

1. Determine which photoeye has failed.
2. Disconnect the photoeye’s electrical connection.
3. Disconnect the photoeye’s mechanical connection and remove it from the part ID stand.
4. Install the new photoeye.
5. Connect the cable to the new photoeye.
6. Test the system.

Troubleshooting

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

The following troubleshooting procedures cover only the most common problems. If the situation continues after attempting the following steps, contact a Nordson representative for assistance.

General

If there is a problem with the part ID stand, check the most recent operations to determine if something caused the malfunction. The following sections provide general guidance for troubleshooting.

Cycle power to the system. If that fails to resolve the problem, continue below.

Table 11

Problem	Possible Cause	Corrective Action
1. No power	Power not applied	Check power to the junction box.
	Open fuses	Replace the fuses.
	Power supply failed	Check for DC voltage out of the power supply. If input is good and no output, replace power supply.
2. System not detecting parts	Beam array not energized	Check that cables are connected from the beam array to the junction box part ID main board.
	Beam array failure	Check that beam array LEDs are on: red for emitter and green for aligned receiver. If no LEDs, check junction box. If receiver LED is yellow or red, align receiver. If beam arrays have power, check that the corresponding LEDs in the junction box turn on when the beams are broken. If they do not, replace the affected beam array.
	Junction box failure	Verify that the junction box zone and part ID LEDs turn on when the beams in those areas are broken. If the board is working but the beams remain off, replace the affected beam arrays. If none of the beam arrays returns a signal to the board, replace the board.
	Output expansion board failure	If the part ID main board is functioning but the LEDs on the output expansion board do not turn on, check • DC power to the board • DIP switch settings If both are correct, replace the board. If voltage is not present, check the power supply and input fuses.
3. Beam Array Receiver red LED on with no part present, or system sees parts when none are present	Receiver not receiving emitter's signal	Clean emitter and receiver beam arrays.
	Beam array needs calibration	Calibrate beam array.
	Beam array emitter is off	Verify emitter red LED is on. If not, check connections and then replace emitter.
4. System Erratic	Software issue	Cycle power and observe the software code and zone information that is displayed by the LEDs on start up. If incorrect software, reprogram or replace the board.

Parts

To order parts, call the Nordson Industrial Coating Systems Customer Support Center at (800) 433-9319 or contact your local Nordson representative.

Using the Illustrated Parts List

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

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

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

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

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

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

Item	Part	Description	Quantity	Note
—	- - - - - -	Assembly	1	
1	- - - - - -	• Subassembly	2	A
2		• • Part	1	

Continued...

NOTE: A.

B.

NS: Not Shown

AR: As Required

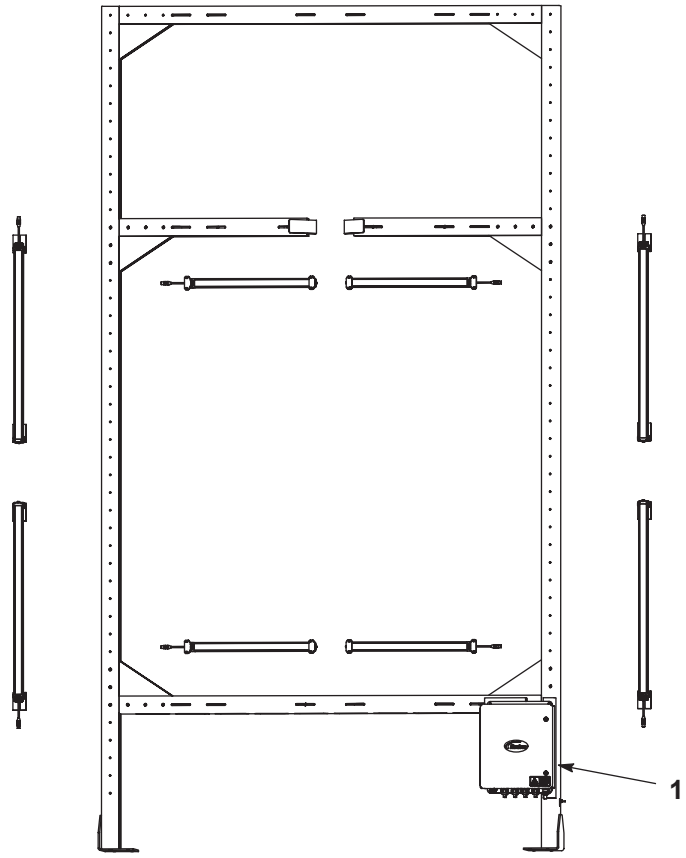


Figure 16 Part ID Stand

Item	Part	Description	Quantity	Note
1	1604257	JUNCTION BOX, Photoeye, iControl	1	
1	1604258	JUNCTION BOX, Beam Array	1	
NS	1603658	CABLE, power, junction box, 30 ft	1	
NS	1604312	CABLE, power, junction box, 50 ft	1	
NS	--------	LABEL SET (for beam array cables)	1	A
NS	1604431	CABLE, beam array, 15 ft	AR	B
NS	1604432	CABLE, beam array, 30 ft	AR	B

NOTE: A. Shipped with item 1.

B. The same beam array cable is used for emitters and receivers.

NS: Not Shown

AR: As Required

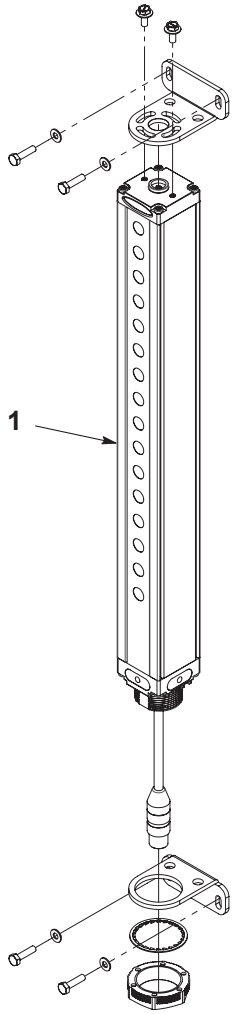


Figure 17 Beam Arrays

Item	Part	Description	Quantity	Note
1	1623254	SENSOR, receiver, beam, 295 mm, add 66, standard resolution	1	
1	1623255	SENSOR, receiver beam, 295 mm, add 67, standard resolution	1	
1	1604942	SENSOR, receiver, beam, 448 mm, add 66, standard resolution	1	
1	1604943	SENSOR, receiver, beam, 448 mm, add 67, standard resolution	1	
1	1623256	SENSOR, receiver, beam, 600 mm, add 66, standard resolution	1	
1	1623257	SENSOR, receiver, beam, 600 mm, add 67, standard resolution	1	
1	1623258	SENSOR, receiver, beam, 600 mm, add 69, standard resolution	1	
1	1623259	SENSOR, receiver, beam, 905 mm, add 69, standard resolution	1	
1	1624312	SENSOR, receiver, beam, 905 mm, add 66, standard resolution	1	
1	1624313	SENSOR, receiver, beam, 905 mm, add 67, standard resolution	1	
1	1604951	SENSOR, receiver, beam, 1514 mm, add 68, standard resolution	1	
1	1604954	SENSOR, receiver, beam, 1819 mm, add 68 standard resolution	1	
1	1604413	EMITTER, standard resolution, 16 beams, 295 mm	1	
1	1604415	EMITTER, standard resolution, 24 beams, 448 mm	1	
1	1604417	EMITTER, standard resolution, 32 beams, 600 mm	1	
1	1604421	EMITTER, standard resolution, 48 beams, 905 mm	1	
1	1604427	EMITTER, standard resolution, 80 beams, 1514 mm	1	
1	1604429	EMITTER, standard resolution, 96 beams, 1819 mm	1	

Photoeyes

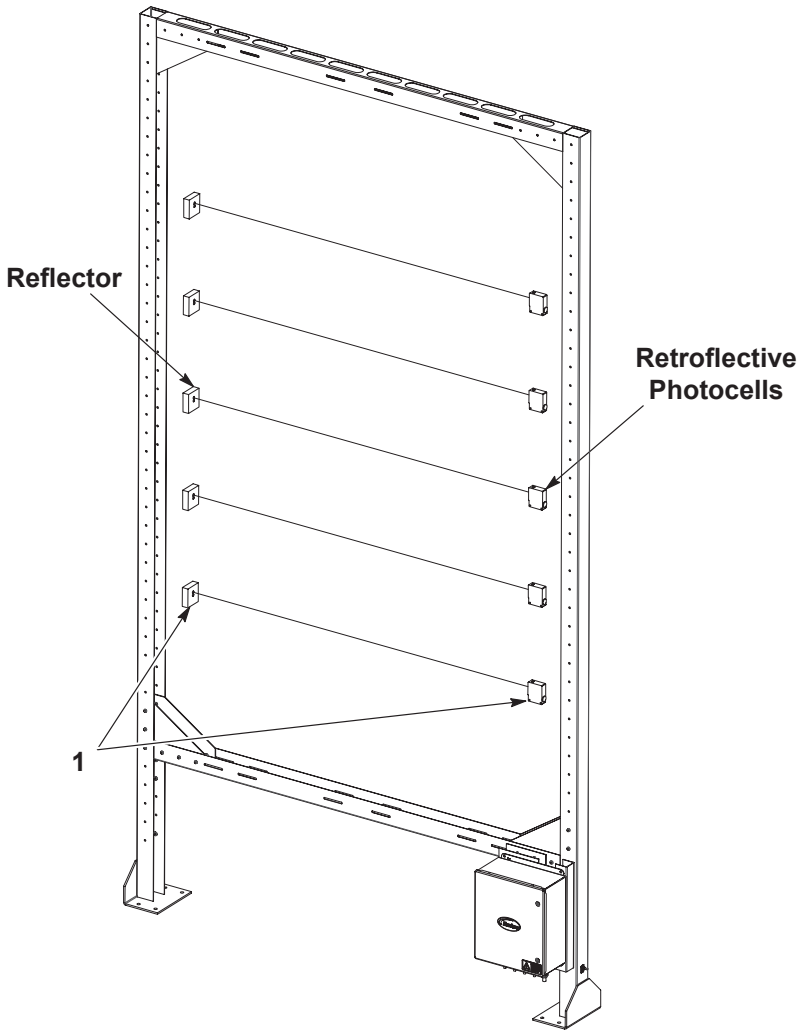


Figure 18 Photoeyes

Item	Part	Description	Quantity	Note
1	170730	PHOTOEYE ASSEMBLY	AR	
NS	803427	CABLE, photoeye	AR	

NS: Not Shown

AR: As Required

Beam Array Junction Box - Expanded Plug-and-Play Version

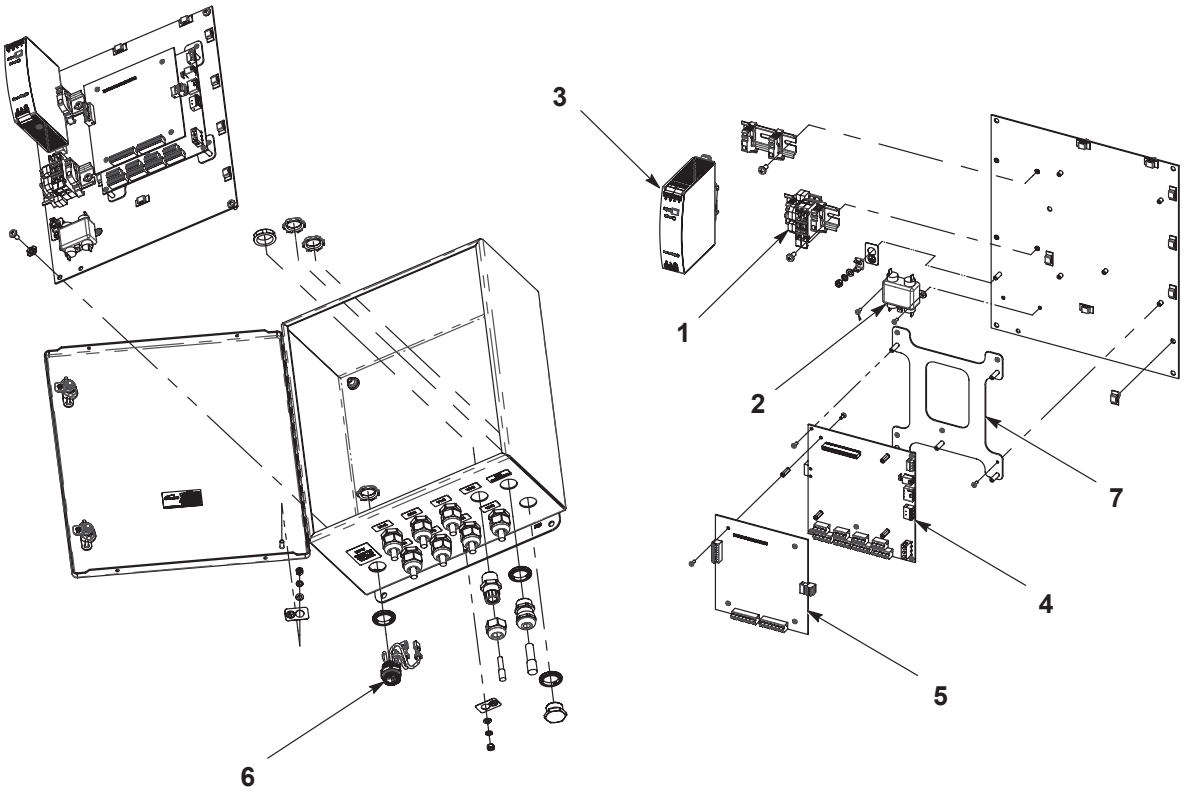


Figure 19 Beam Array Junction Box

Item	Part	Description	Quantity	Note
—	1604258	JUNCTION BOX, discrete beam array	1	
1	1604236	• ASSEMBLY, terminal fuse block	1	
2	1604237	• 5A filter	1	
3	1604238	• POWER SUPPLY, 80 W	1	
4	1602020	• PCA, NUIO main part ID	1	
5	1603971	• BOARD, output expansion	1	
6	--------	• RECEPTACLE, AC	1	
7	--------	• BRACKET, PCA, mount, part ID	1	
NS	--------	• Label set	1	
NS	--------	• Suppressor, Ferrite, 7 mm diameter	1	A
NS	--------	• Suppressor, Ferrite, 10 mm diameter	1	A
NS	114876	• Fuse, 4 A	2	
NS	--------	• Harness set, power jumper, beam array	1	

NOTE: A. See the beam array junction box schematic for location

NS: Not Shown

Photoeye Conjunction Box

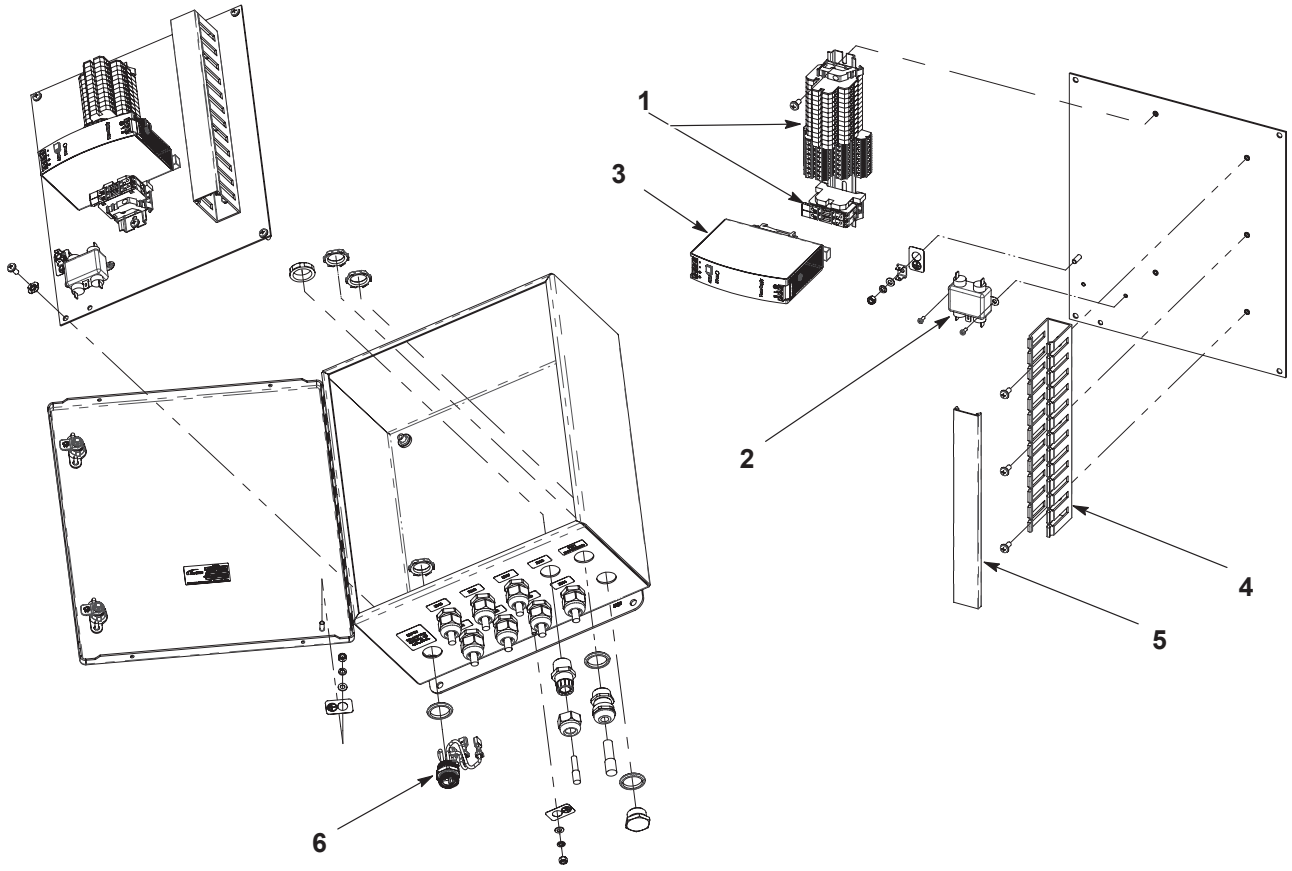


Figure 20 Photoeye Junction Box

Item	Part	Description	Quantity	Note
—	1604257	JUNCTION BOX, PHOTOEYE	1	
1	---------	• ASSEMBLY, Terminal Fuse Block	1	
2	--------	• 5A Filter	1	
3	1604238	• POWER SUPPLY, 80 W	1	
4	--------	• DUCT, wire, wide slot, 1x2x10	1	
5	---------	• COVER, wire duct, 1x10	1	
6	--------	• RECEPTACLE, AC	1	
NS	--------	• Label set	1	
NS	114876	• Fuse, 4 A	2	
NS	--------	• Harness set, power jumper, photoeye	1	
NS: Not Shown				

Appendix 1: Configuration Using EZ Ladder

The part ID stand can be assembled and operated from the factory without programming using EZ Ladder. In the rare cases when EZ Ladder's functionality is needed, follow the Instructions section. Consult a Nordson representative for assistance before proceeding.

Analog Output Calibration

See Figure 21.

The analog output calibration section is located between rungs 32 and 35. The default calibration values are 0.0 for 0 Vdc and 93.5 for 10 Vdc. Use this procedure to calibrate the board.

1. Connect a DC voltmeter to the first analog output on TSR4 from ground to positive.
2. Adjust the calibration values fields in EZ Ladder to achieve the desired results. If the meter reading is higher than expected, decrease the value in EZ Ladder.
3. Adjust the EZ Ladder value until each axis reads on the voltmeter 0 Vdc with no beams blocked and 10.0 Vdc with all beams blocked.
4. Change StdOutExpAnaCal to 1 and then back to 0 to write the calibration values to EEPROM.

NOTE: The FBB and LBB fields are shown for reference only.

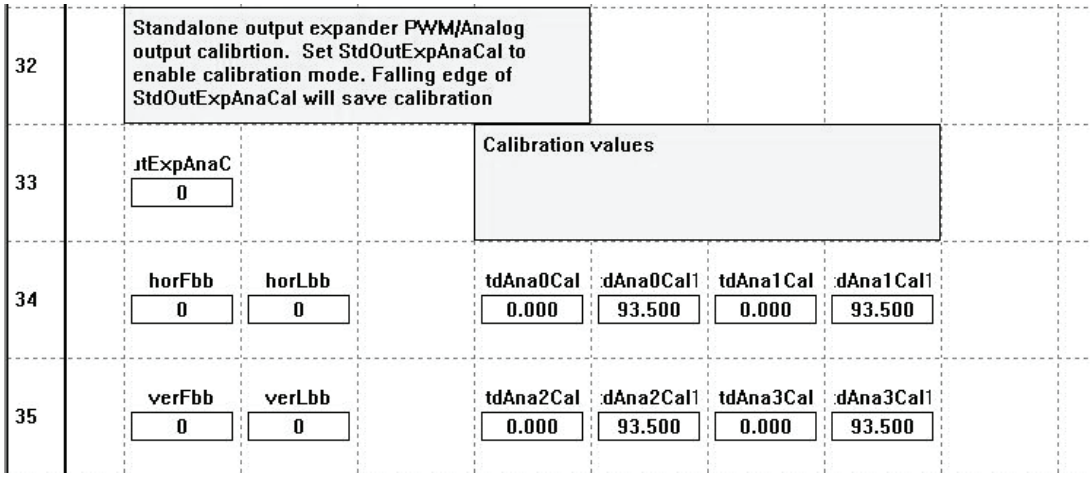


Figure 21 Analog Output Calibration

Zone Configuration

See Figure 22.

The zone configuration section is located between rungs 42 and 45. The default zones are divided by the number set on the BCD switch into equal groupings. Use this procedure to customize the number and size of the zones. Zones can overlap.

1. Verify the number of beams per horizontal and vertical axis.
2. Enter the desired starting and ending beam for each zone. Up to eight zones can be configured.
3. For any unused zones, leave the values at 0.
4. Zone 1 is at the top, and zone 8 is at the bottom. The last beam is at the top, and beam 1 is at the bottom.
5. Change fZoneCfg to 1 and then back to 0 to write the zone values to EEPROM.

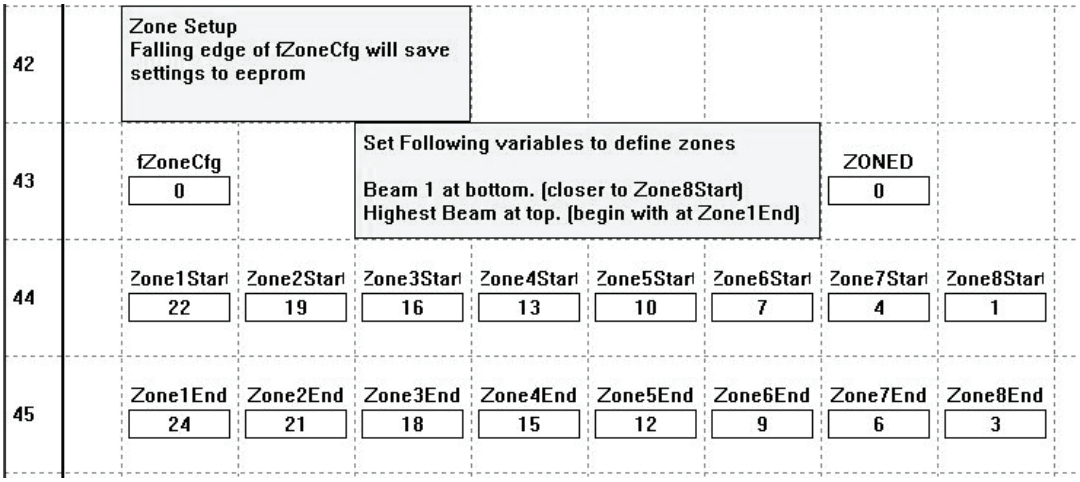


Figure 22 Zone Configuration

Vertical Gap Configuration

See Figure 23.

The vertical gap configuration section is located between rungs 52 and 54. The default gap is set to 1 in. if dual vertical beam arrays are installed. Use this procedure to set the gap between arrays.

1. Measure the gap between the vertical beam arrays.
2. Enter the measured value in the StdVertGap field.
3. Change fVertGapCfg to 1 and then back to 0 to write the zone values to EEPROM.
4. S_VerticalGap should read a scaled value corresponding to the measured value. Zero in. equals 0 and 10.0 in. equals 100.

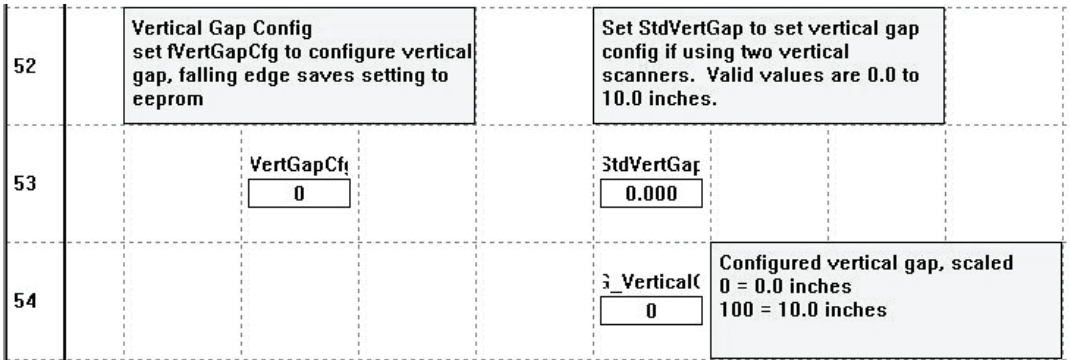


Figure 23 Vertical Gap Configuration

Blanking Configuration

See Figure 24.

The blanking configuration section is located between rungs 63 and 67. The default horizontal blank is set to 0, assuming that the conveyor is mounted above the light curtain. Use this procedure to set the blanking width for the conveyor.

1. Enter the address of the beam array to be blanked in Std CurrAddr.
2. Block only the beams that need to be blanked.
3. Beam information should appear in the FBB and LBB fields.
4. Change StdCurSaveBlanking to 1 and then back to 0 to write the blanking values from EEPROM.

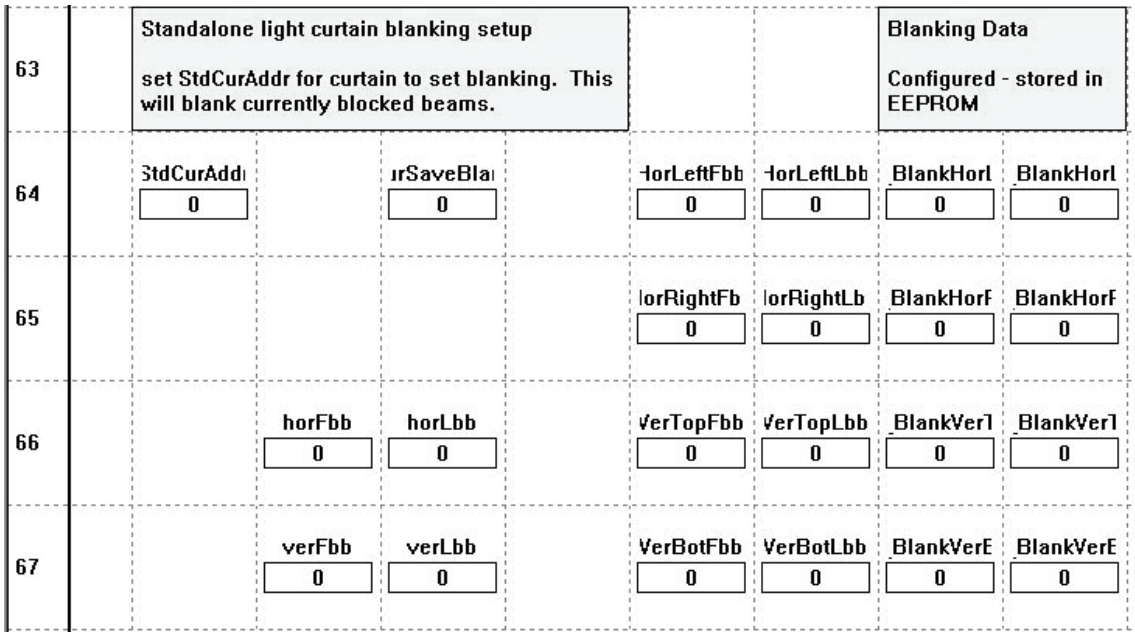


Figure 24 Blanking Configuration

Light Curtain Address Scan

See Figure 25.

The address scan section is located between rungs 26 and 30. This screen scans the bus for any light curtains addressed from 65 to 90. Use this procedure to verify that the software is communicating with all of the beam arrays.

1. Enter a 1 in the AddressScan field.
2. Any addresses at which a beam array is detected will display 750 for low-resolution arrays.
3. If a beam array is missed, rescan before moving on to the other troubleshooting practices.
4. Verify that the AddressScan field is set to 0.

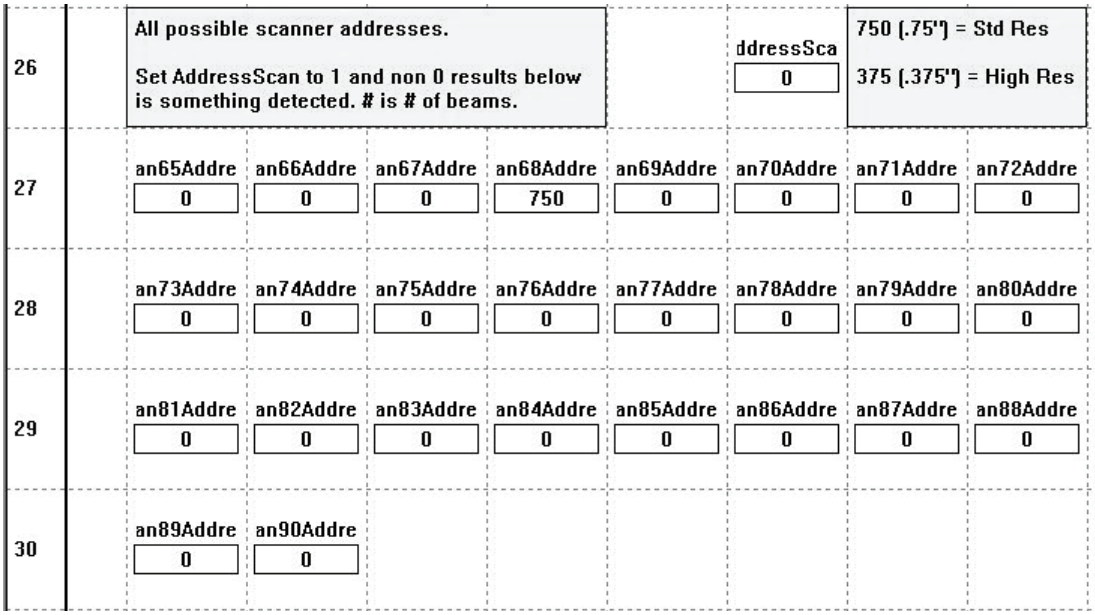


Figure 25 Light Curtain Addressing