# Part ID System with I/O Board for Encore® Engage

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 | 04/21 | Initial Release |
| 02 | 02/23 | Corrections for beam spacing, installation instructions, and beam arrays information. |
| 03 | 09/23 | Added 2 list lines and changed descriptions to remove sales order |
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# 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 and transmits part location and shape dimension to the system controller of an automated spray system. The junction box transmits data to the system controls. The system will 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 Encore Engage 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.
4. I/O board card functionality adds:
    - 8 photoeye inputs
    - 8 preset inputs 1-255
    - 32 encoded direct triggers (Banks)

# Features

## Junction Box

The Nordson junction box provides an interface between the part identification 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 an Encore Engage system.

1. **Photoeye sensors** − model for use with photoeyes with auxiliary I/O board. The junction box provides a 24 Vdc power source and a connection to eight photoeye sensors only.
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 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 array with Encore Engage** − model for use with beam array sensors provides a Modbus TCP connection for use with the Encore Engage. A custom PLC can also be used with this junction box and would connect via the Modbus TCP connection.

   **NOTE:** Refer to the Expanded Plug-and-Play Part ID System manual for photoeye sensors and expanded plug-and-play beam array information.
4. **Preset inputs**: from external PLC.
5. **Direct Triggering** − The zone inputs can also be configured so that an external controller can be connected to the inputs to trigger the spray guns immediately upon the change in state of a bit or series of bits. In this mode, the Encore Engage acts like a simple gun control console without he need for a conveyor encoder or zone photoeyes or scanners. The junction box can communicate with 32 spray guns using the input controls: Bank 0, Bank 1, and Strobe.

| 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.

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

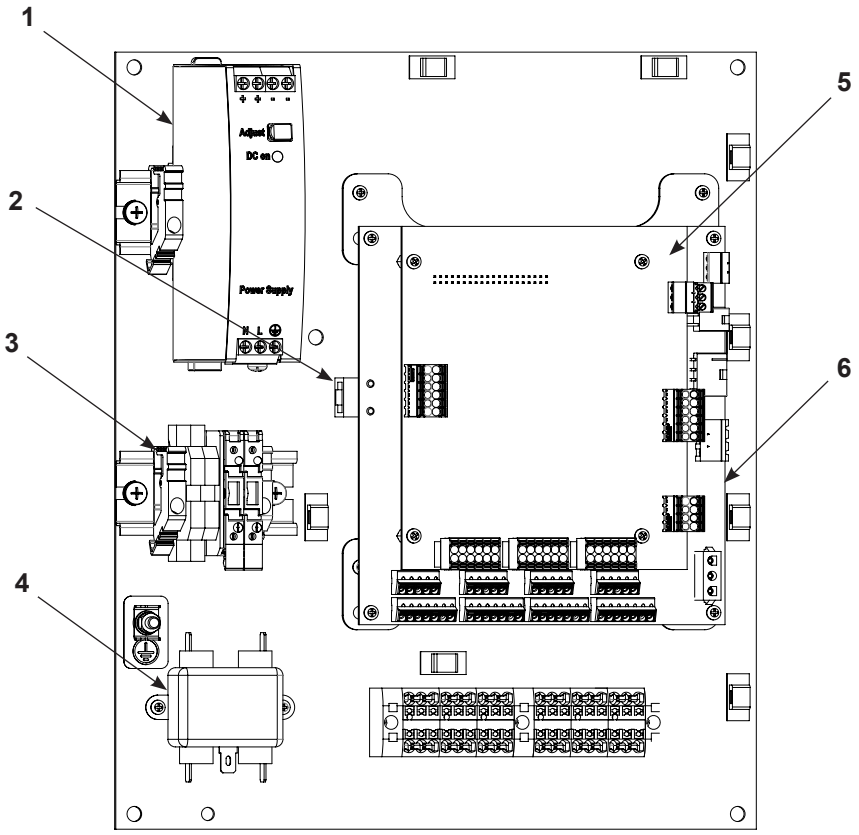



Figure 1 Junction Box

1. Power supply
2. Ethernet connection
3. Fuses
4. Input filter
5. I/O board
6. Part ID main board

## 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 to run the conveyor 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.

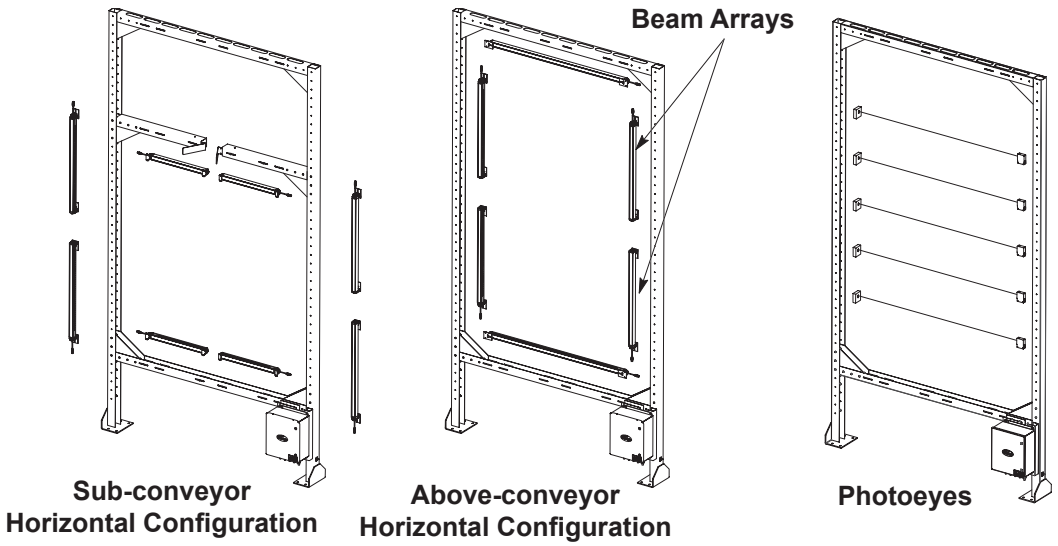



Figure 2 Junction Box with Part ID Stand and Arrays

# 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 the Encore Engage system or a custom PLC via Modbus TCP. Spray triggering systems using beam arrays without the Modbus protocol require an output expansion board.

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

## Part ID Main Board LEDs and Switches

See Figure 3 and refer to Table 1.

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

Refer to Table 2 for the meaning of the LED states.

Refer to 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, which allows use of another address programming tool to configure beam arrays |
| | When connected to an Encore Engage, 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 Encore Engage or custom PLC |
| Modbus/CAN Jumper | Selected to use Modbus TCP or CAN (not currently implemented) |

## Zone LEDs

See Figure 3.

The 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.

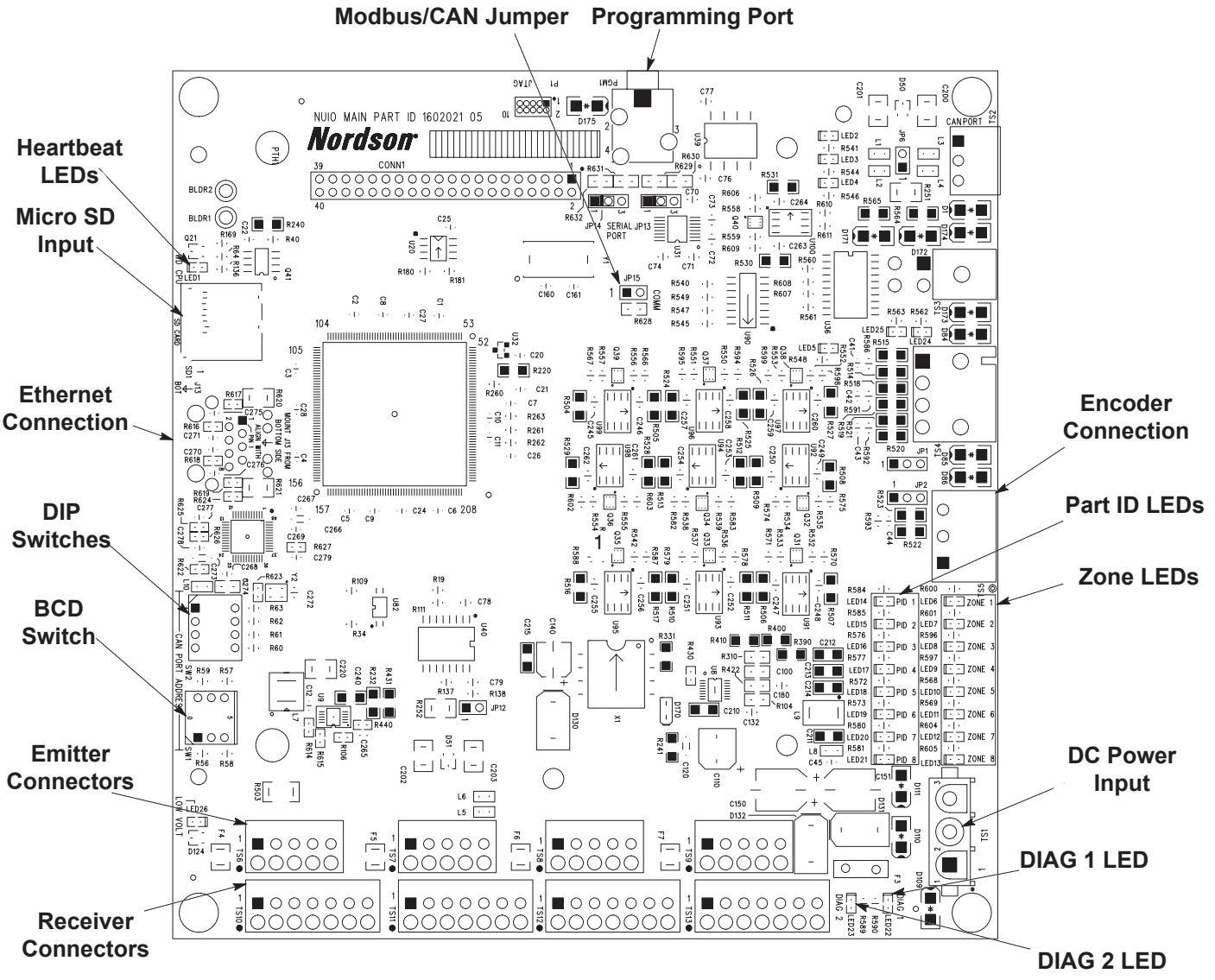



Figure 3 Part ID Main Board

## Reading the Diagnostic LEDs

Refer to Table 2 and Table 3 for 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 the configuration is complete, the LEDs will turn off and remain off.

Table 2 Diagnostic LED Meanings

| 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. |

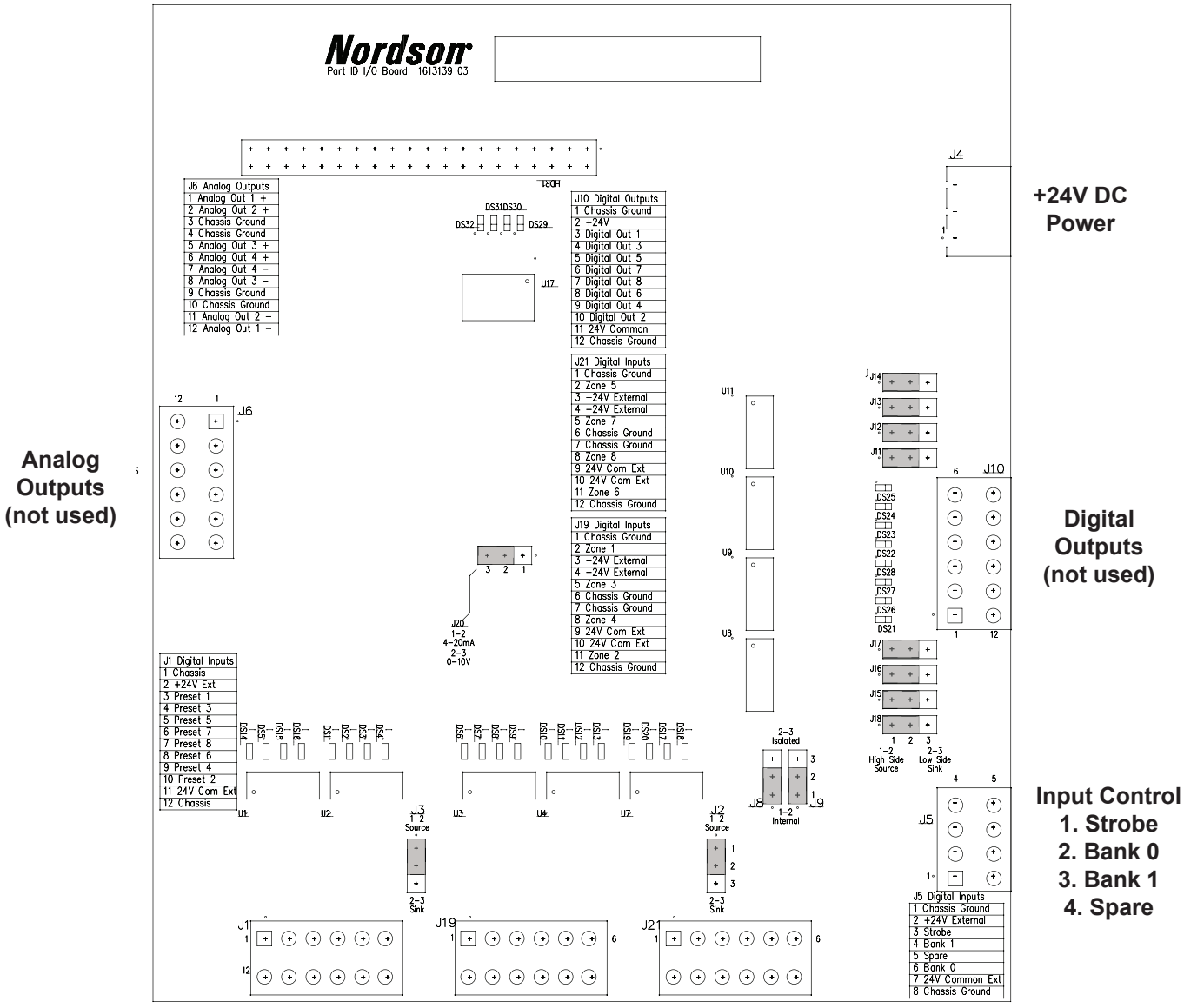



Figure 4 Part ID I/O Board

## Part ID LEDs

See Figure 5 and refer to Table 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.

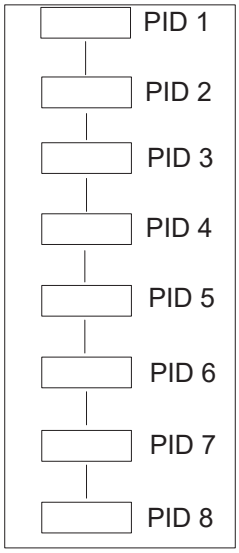



Figure 5 Part ID LEDs

Table 4 Part ID LED Descriptions and Addresses

| LED | Description | Address |
|---|---|---|
| PID 1 | Horizontal single/right | 66 |
| PID 2 | Horizontal left | 67 |
| PID 3 | Vertical single/bottom | 68 |
| PID 4 | Vertical top | 69 |
| PID 5 | Flagging | 70 |
| PID 6 | Default address detected | — |
| PID 7 | Illegal address detected | — |
| PID 8 | No curtains or error | — |

# 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

### Junction Box and Beam Array Assembly

See Figure 6.

**NOTE:** Beam array cables require specific routing.

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

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 Encore Engage | Power supply, part ID main board, I/O board |

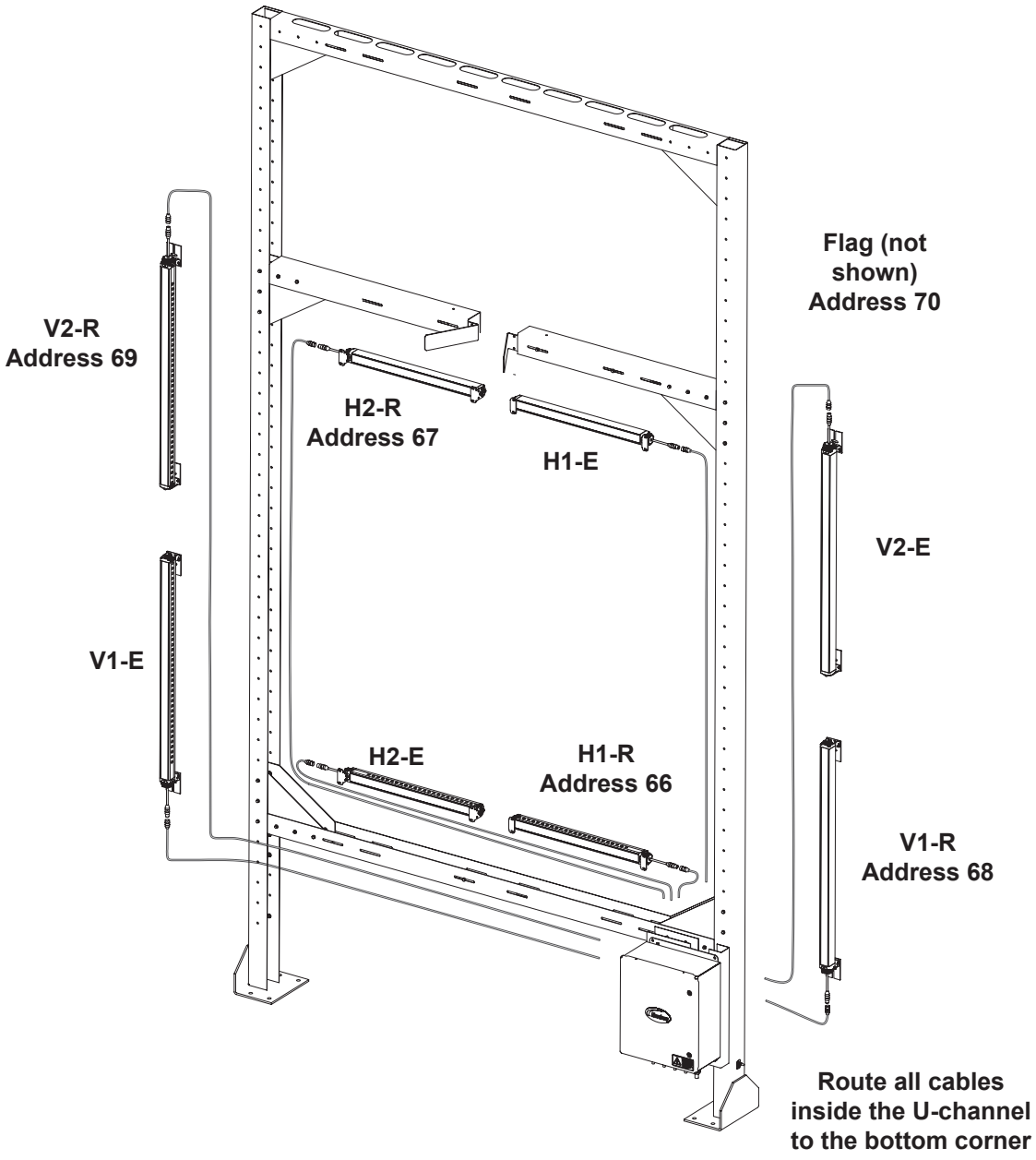



Figure 6 Sensor Location and Cable Routing

### Beam Arrays with Photoeyes

See Figure 7 for installation configured with photoeyes.

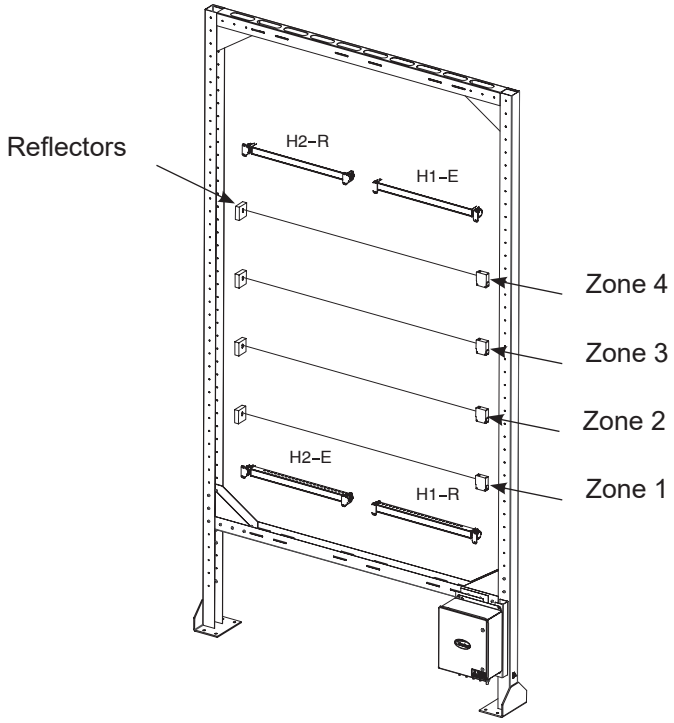



Figure 7 Photoeye Zones (shown with 4 zones)

## Configure the Junction Box and Sensors

### Connect Beam Arrays and Photoeyes to Junction Box

See Figure 8.

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.

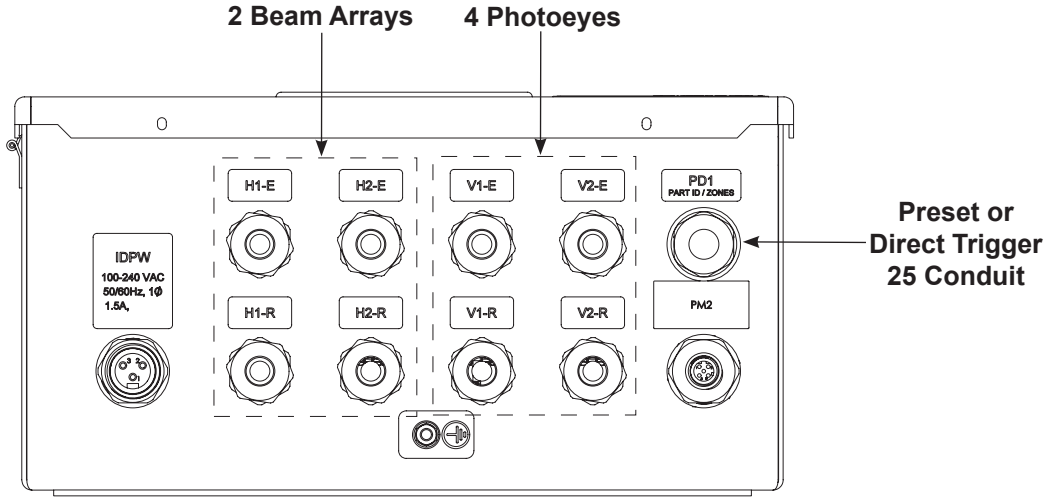



Figure 8 Beam Array and Photoeye Sensor Cable Entrance to Junction Box (outside bottom view)

1. See Figure 9, Figure 10, Figure 11, and Figure 12. Connect the beam array and photoeye cables to the junction box.

   **NOTE:** Cable wires are stripped and tinned in the factory. If cable needs to be trimmed, a ferrule must be used.

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

   b. Proceed to the  section for additional installation requirements.

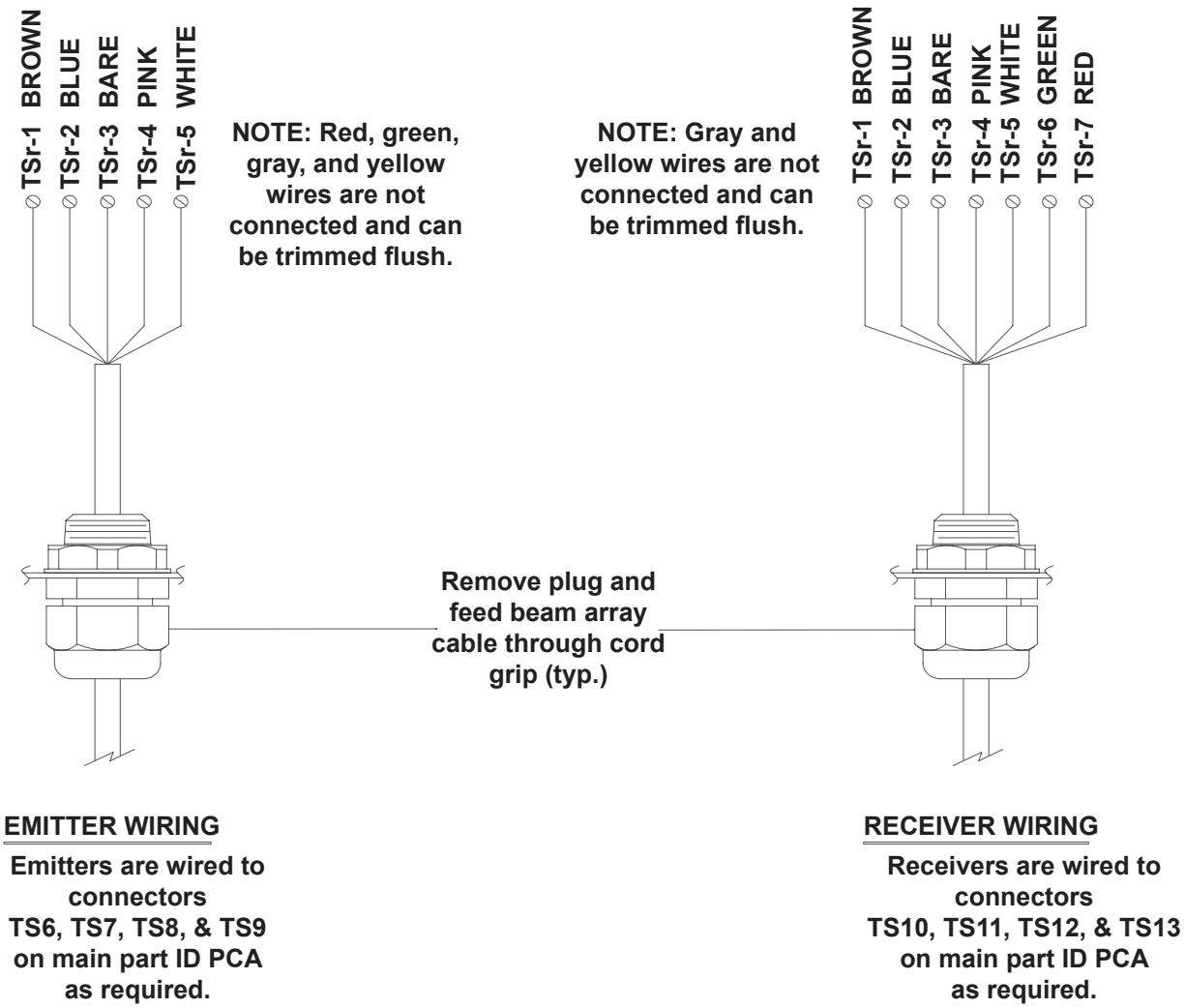



Figure 9  Beam Array Junction Box Wiring

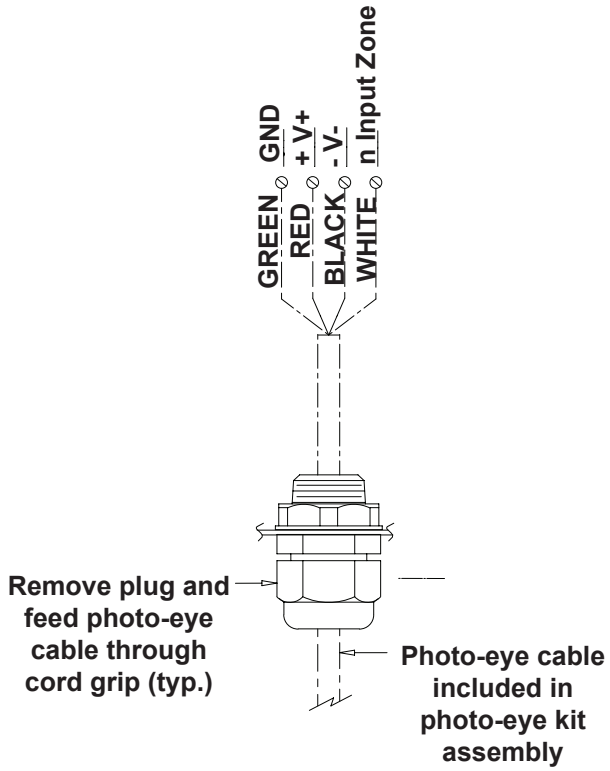



Figure 10 Photoeye Junction Box Wiring

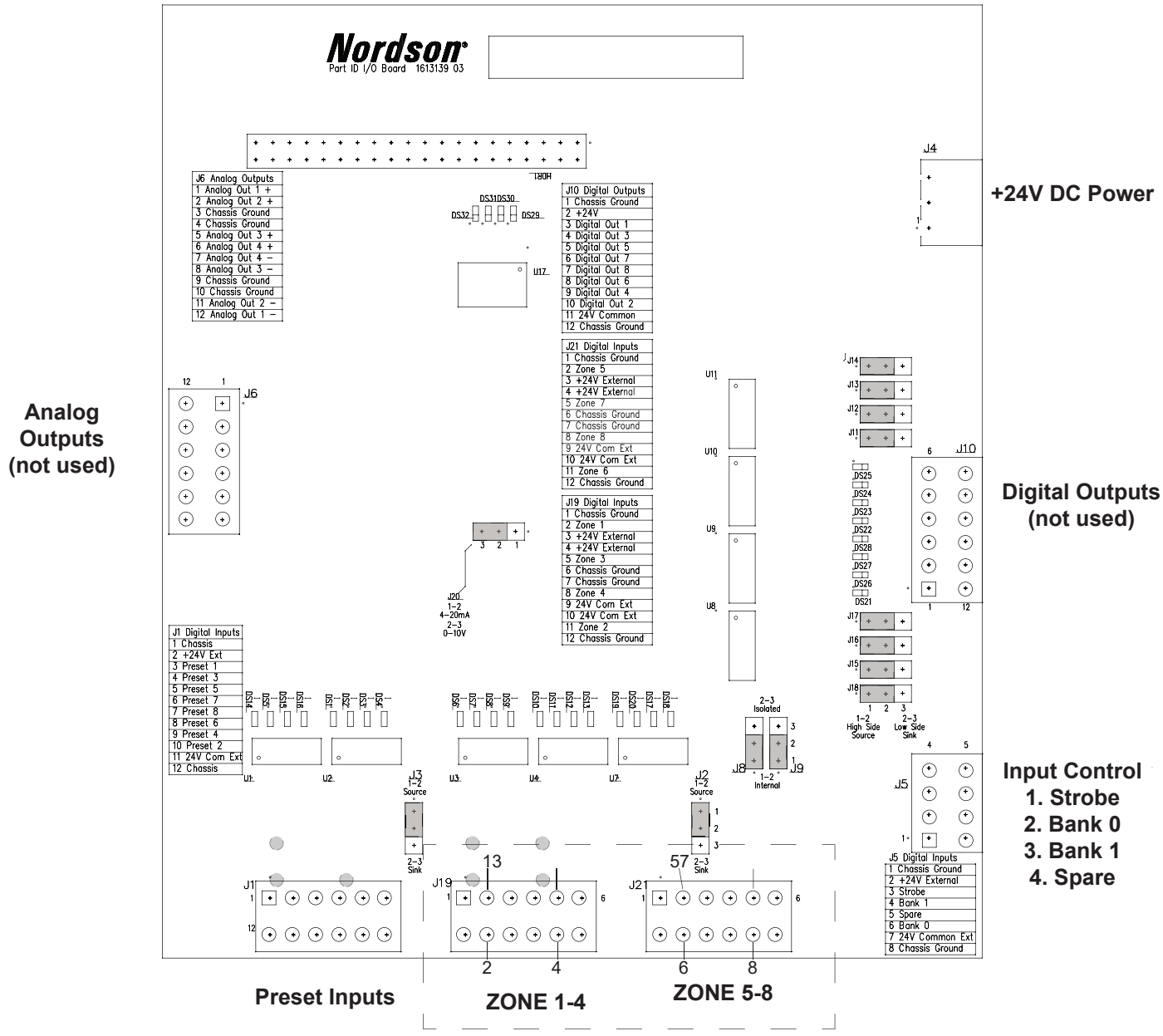



Figure 11 Zone I/O Board Connections

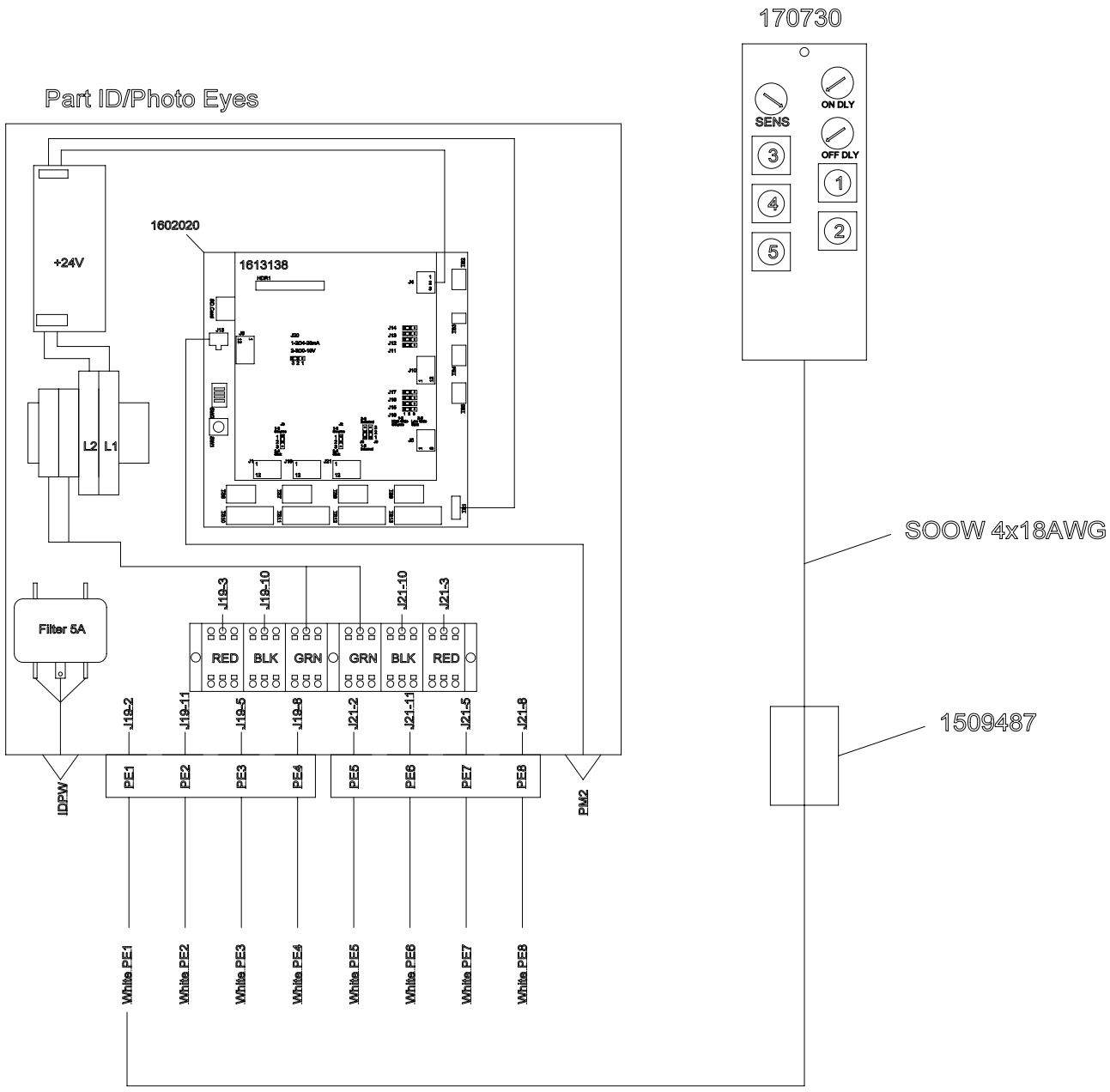



Figure 12 Cable Connections in Junction Box

## Part ID Cable Connection

The PD1 cable plugs into the bottom of the junction box (see Figure 8 for location) and is used for bringing in external PLC triggering and part IDs. Use a liquid-tight cord grip to bring the cable into the PEJB.

**NOTE:** Not for use with scanners or photoeyes.

Connect the cable to the terminal block in the PEJB, using Table 6. See Figure 12 for board locations.

Table 6 Part ID Cable PD1 Pinouts, Wire Colors, and Functions

| Pin Number | Wire Color | Function | I/O Board Connections |
|---|---|---|---|
| 1 | Black | Trigger bit 1 | J19-2 (LSB) |
| 2 | Brown | Trigger bit 2 | J19-11 |
| 3 | Red | Trigger bit 3 | J19-5 |
| 4 | Orange | Trigger bit 4 | J19-8 |
| 5 | Yellow | Trigger bit 5 | J2-2 |
| 6 | Green | Trigger bit 6 | J2-11 |
| 7 | Blue | Trigger bit 7 | J2-5 |
| 8 | Violet | Trigger bit 8 | J2-8 (MSB) |
| 9 | Gray | Part ID bit 1 | J1-3 |
| 10 | White | Part ID bit 2 | J1-10 |
| 11 | White/Black | Part ID bit 3 | J1-4 |
| 12 | White/Brown | Part ID bit 4 | J1-9 |
| 13 | White/Red | Part ID bit 5 | J1-5 |
| 14 | White/Orange | Part ID bit 6 | J1-8 |
| 15 | White/Yellow | Part ID bit 7 | J1-6 |
| 16 | White/Green | Part ID bit 8 | J1-7 |
| 17 | White/Blue | Trigger Bank 0 | J5-6 |
| 18 | White/Violet | Trigger Bank 1 | J5-4 |
| 19 | White/Gray | Trigger Strobe | J5-3 |
| 20 | White/Black/Brown | spare | –– |
| 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 Direct Triggering

Refer to Table 6 and Table 7. When Direct Triggering is selected, trigger bits 1−8 on the I/O board trigger spray guns 1−8 when activated. Guns 9−16, 17−24, and 25−32 are triggered through these same trigger bits along with signals on Trigger Banks (Pin 17 and 18), as follows:

Table 7 Direct Trigger Bank

| Spray Gun | Bank 1 | Bank 0 |
|---|---|---|
| 1-8 | 0 | 0 |
| 9-16 | 0 | 1 |
| 17-24 | 1 | 0 |
| 25-32 | 1 | 1 |
| **NOTE:** The data must be strobed to latch the inputs. Board can only strobe 8 bits at a time. | | |

Pin 19 functions as the input strobe, or enable bits. When Pin 19 is turned on the active bits between 1 and 8 trigger the appropriate gun. When the strobe is removed the guns remain triggered on. Turning the strobe back on will turn the guns off.

Sample Data: 0 0 0 0 1 1 1 1 (Guns 1-4 ON)

To turn on guns 1−16 then, turn on bits 1−8, strobe Pin 19, then turn on Pin 17 and strobe Pin 19 again. To turn off the guns, turn on Pin 17 and strobe Pin 19, turn off Pin 17 and strobe Pin 19 again.

# Configure Circuit Boards

## Hardware Setup

See Figure 3 for switch locations on board.

1. Configure the part ID main board DIP switches (SW-2). Refer to Table 8 for a description of the function of each dip switch and refer to Table 9 for overall switch configurations.

**NOTE:** See Figure 13. Off refers to the switch being open, and On refers to the switch being closed. For example, when the switch is Off, it is pressed in on the side closest to the board edge; when the switch is On, it is pressed in on the side further from the board edge.

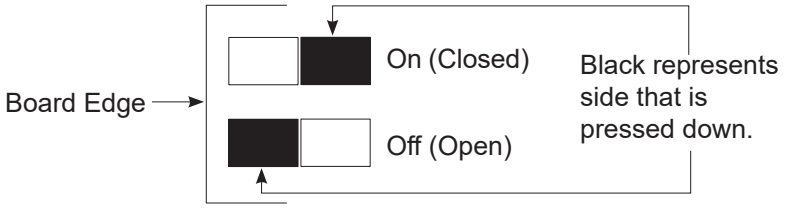
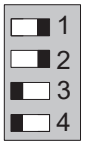
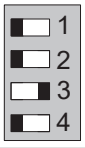
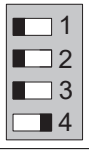



Figure 13 DIP Switch Setting Examples

Table 8 Dip Switch Settings

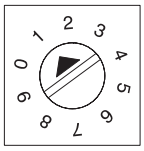
| Switch | Function | Factory Settings |
|---|---|---|
| 1 | Off: Encore Engage (remote)<br>On: discrete | Off |
| 2 | Off: no output expansion board<br>On: output expansion board installed | Off |
| 3 | Off: No I/O card<br>On: I/O card | ON |
| 4 | Off: no effect<br>On: erase EEPROM | Off |

Table 9 SW-2 Switch Setting Configurations

| SW-2 | Setting Configuration |
|---|---|
|  | External PLC |
|  | I/O card present (Engage) |
|  | EEPROM Erase |

2. Use Table 10 to configure the BCD switch (SW-1).

Table 10 SW-1 Switch

| SW-1 | Position | Description |
|---|---|---|
|  | 0 | Used to reprogram the addresses of beam arrays. |
| | 1 - 8 | Determines the last digits of the address for vertical zones.<br>Part ID Address: 192.162.1.(111-118)<br>NOTE: The Encore Engage is always a static IP address. |

## 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 all true.

- EEPROM is blank
- At least one light curtain is found with an address of 68 (vertical 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 saves 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
- 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. Turn Off power to the system.
2. Remove the Ethernet cable.
3. Set SW-2 DIP switch 4 to On.  Refer to Table 9 for EEPROM Erase switch position.
4. Energize the system for 2 seconds and wait for the Part ID and Zone LEDs to turn on (16 LEDS).  See Figure 3 for LED locations.
5. Turn power off.
6. Return DIP switch 4 to Off and reconnect ethernet cable.
7. Turn the power back On.
8. To confirm the EEPROM is blank, the software version will blink on the diagnostic LEDs.  If the LEDs do not blink, the EEPROM clearing procedure will have to be repeated.

## 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
   - Using a hand or a tool, break each beam or zone and verify that the corresponding LED on the part ID main board turns on

## Horizontal Beam Blanking Procedure for Above-Conveyor Model

Contact a Nordson representative for assistance.

# Configuring Zones

## Vertical Zones

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

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 Encore Engage. The two methods of setting zones produce different results. Table 6 provides an explanation of the differences.

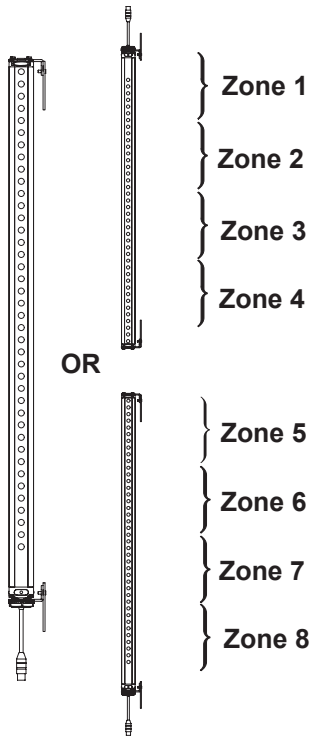



Figure 14 Vertical Beam Array Configuration

Table 11 Digital Zone Configuration Differences

| Parameter | BCD Switch | Programmed |
|---|---|---|
| Maximum number of zones | 8 | 8 |
| Zone size and shape | Zones are equal size and spaced sequentially without overlap. Refer to zones 1−8 in Figure 9. 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.

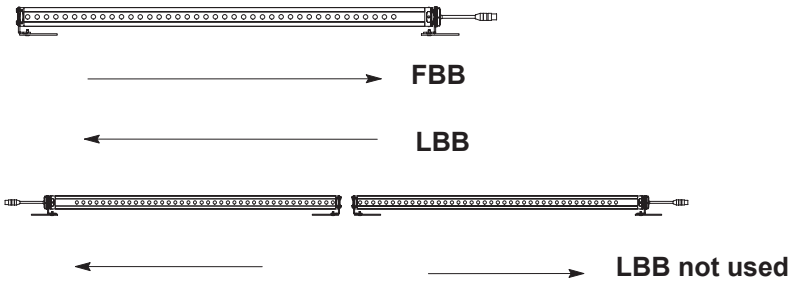



Figure 15 Horizontal Beam Array Configuration

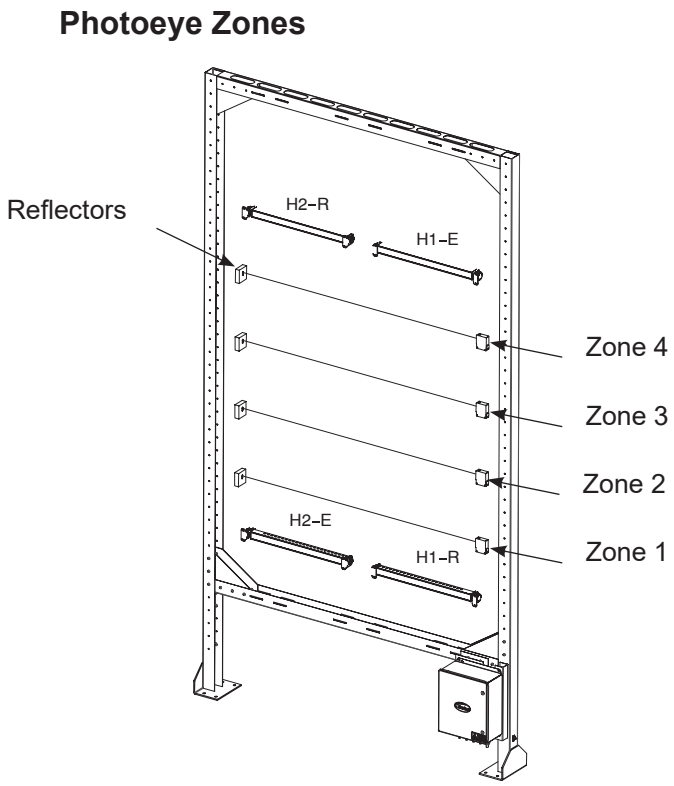



Figure 16 Photoeye Zones (shown with 4 zones)

# 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 12.

1. Turn off power to the junction box.
2. Insert a micro SD card containing the software into the micro SD slot on the part ID 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.

Table 12 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

Beam arrays are pre-addressed. Be sure to order the correct replacement array.

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 13 and Figure 18. Refer to the Parts section for part numbers. Contact a Nordson representative to reprogram a beam array address.

Table 13 Beam Array Addresses

| Array Number | Location | Address |
|---|---|---|
| H1−R | 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) |

9. Attach the mounting brackets to the beam arrays and orient them according to Figure 17. Position the brackets for the receivers and emitters 180 degrees apart, in a parallel orientation, to allow for proper alignment.

**NOTE:** Beam arrays are programmed at the factory and must be installed as shown in Figure 18.

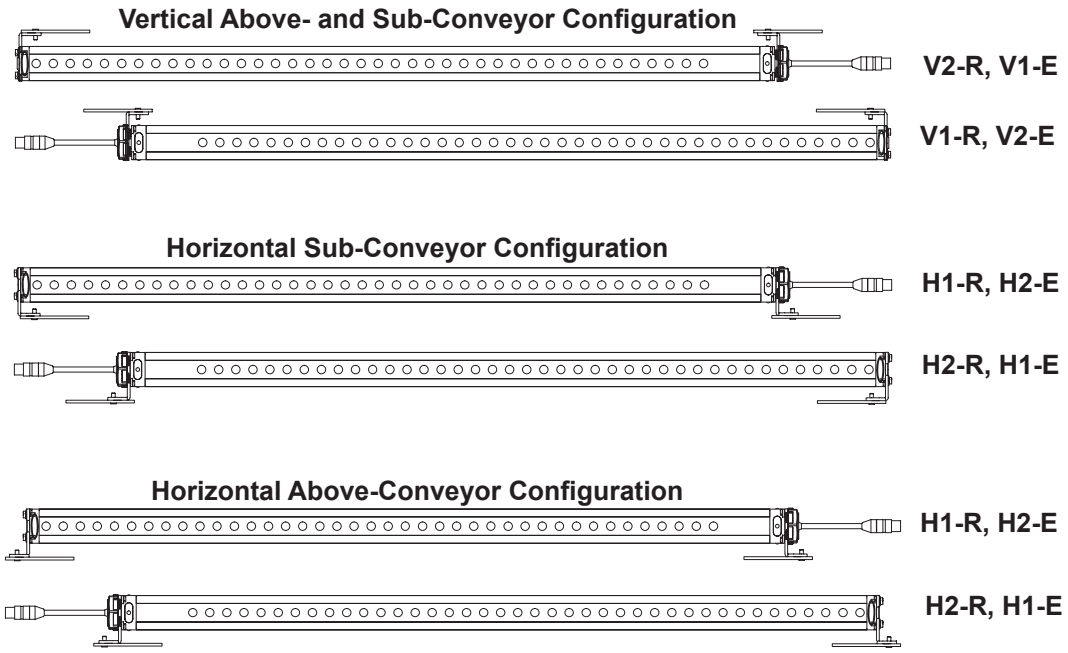



Figure 17 Beam Array Bracket Orientation

10. See Figure 18. 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. They will be fully secured after beam alignment is completed after initial startup.
    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.

**NOTE:** The horizontal receivers should be opposite the horizontal emitters. Note the orientation in Figure 18.

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.

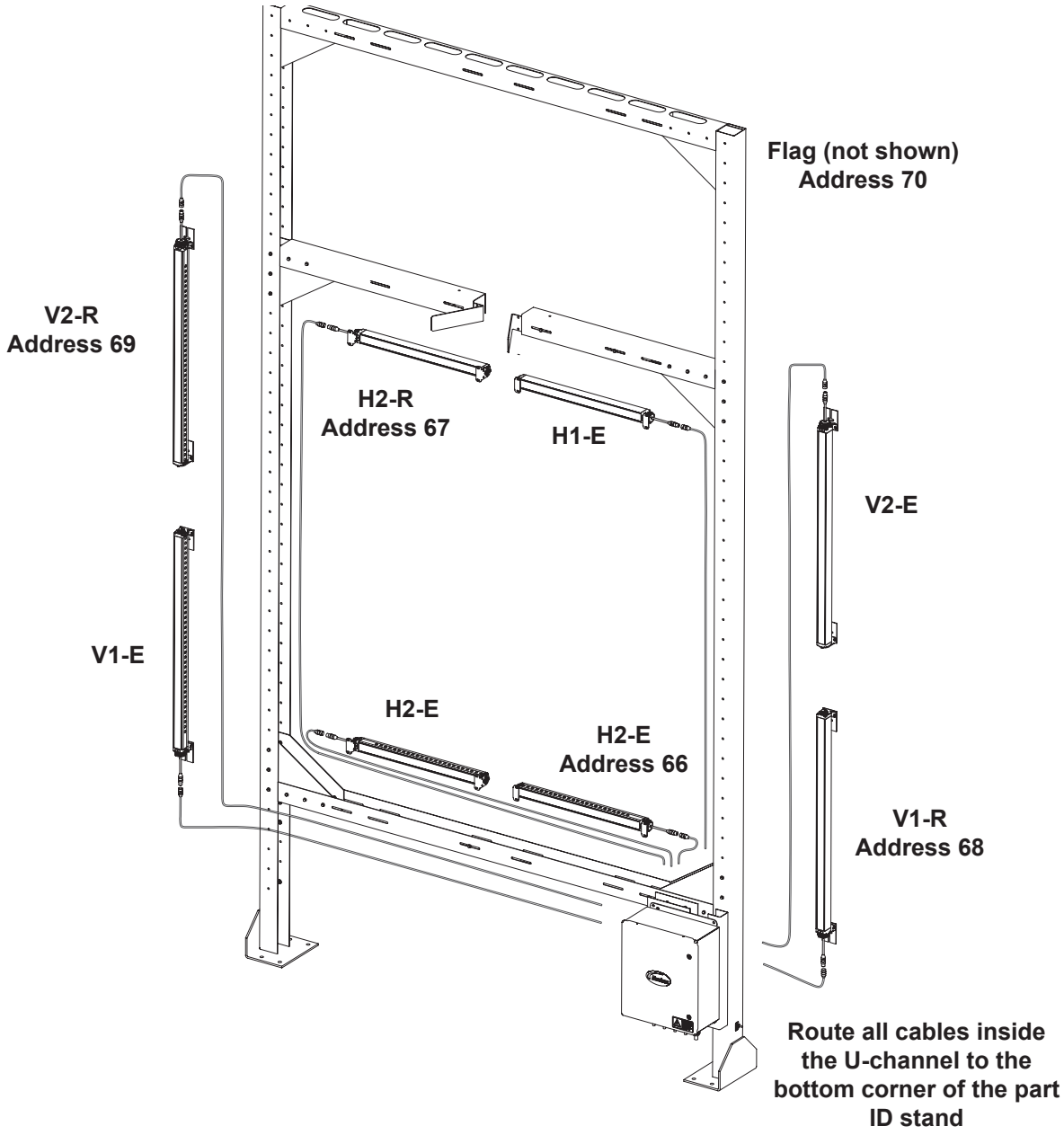



Figure 18 Sensor Location and Cable Routing

# 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 to the following troubleshooting procedures.

| 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 arrays 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.<br>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. |
| **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 or PLC 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. |
| **5. Flashing DIAG 1 LED** | Watchdog failure | Verify communication links are in place between part ID main board and Encore Engage (or remote device). Watchdog failure indicates the part ID main board is not detecting communication from the Encore Engage (or remote device). |

# 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 | Part | Part | Description | Quantity | Note |
|---|---|---|---|---|---|---|
| — | 000000 | 000000 | — | Assembly | 1 | |
| 1 | 00000 | - - - - - - | 00000 | • Sub-assembly | 2 | A |
| 2 | 00000 | 00000 | - - - - - - | • • Part | 1 | B |

NOTE: A.

B.

NS: Not Shown

# Part ID Stand

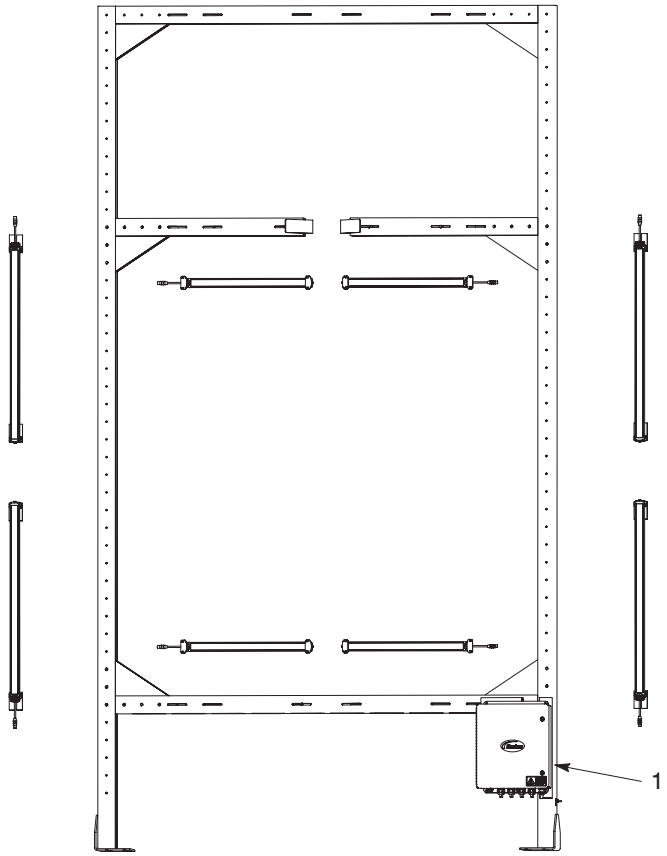



Figure 19 Part ID Stand

| Item | Part | Description | Quantity | Note |
|---|---|---|---|---|
| 1 | 1618893 | JUNCTION BOX, part ID, Engage | 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

# Beam Arrays

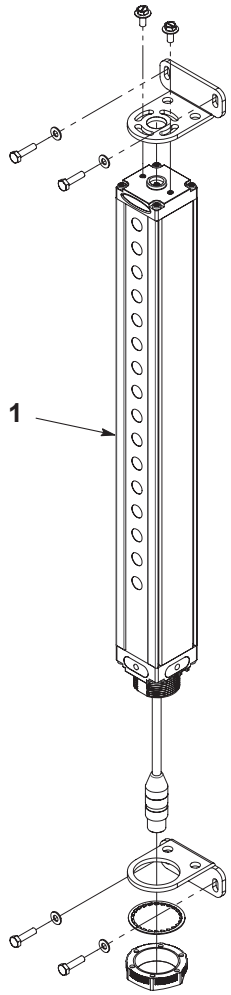



Figure 20 Beam Arrays

| 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 | |

# Beam Array Junction Box - Encore Engage Version

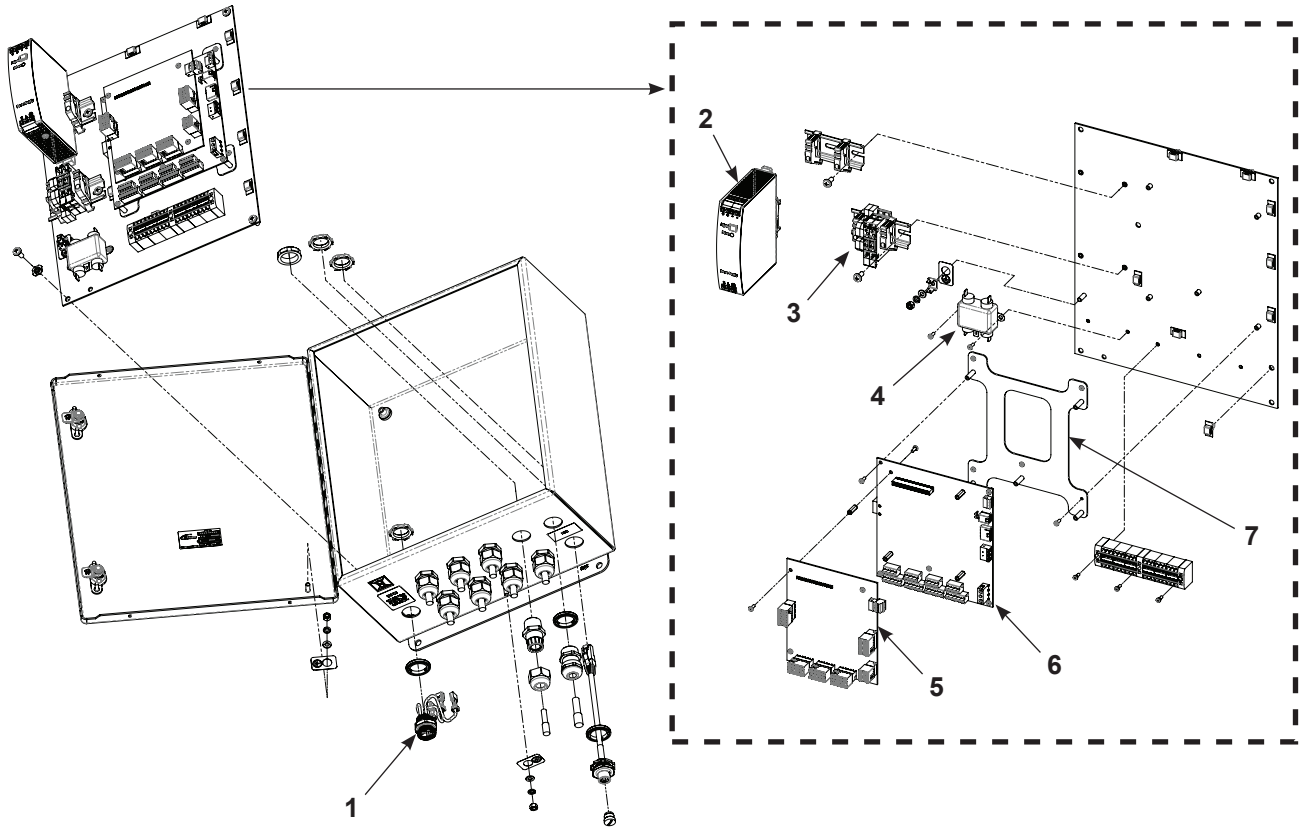



Figure 21 Beam Array Junction Box

| Item | Part | Description | Quantity | Note |
|---|---|---|---|---|
| — | 1618893 | JUNCTION BOX, part ID, Engage | 1 | |
| 1 | ------ | • RECEPTACLE, AC | 1 | |
| 2 | 1604238 | • POWER SUPPLY, 80 W | 1 | |
| 3 | ------- | • TERMINAL FUSE BLOCK ASSEMBLY | 1 | |
| 4 | ------- | • 5A FILTER | 1 | |
| 5 | ------- | • PCA, part ID I/O board | 1 | |
| 6 | 1602020 | • PCA, NUIO main part ID | 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, 4A | 2 | |
| NS | ------ | • HARNESS SET, power jumper, beam array | 1 | |
| NOTE: A. See the beam array junction box schematic for location.<br>NS: Not Shown | | | | |

# Photoeyes

| Item | Part | Description | Quantity | Note |
|---|---|---|---|---|
| — | 1619036 | KIT, photoeye, Engage | 1 | A |
| 1 | 1619212 | KIT, photoeye, wire goods, Engage | 1 | A |
| 2 | 803427 | CABLE, 4 conductor, SO, 18 AWG, black, 600 V, 90C | 1 | B |

NOTE: A. Includes harness set.

B. Optional cable for additional length.