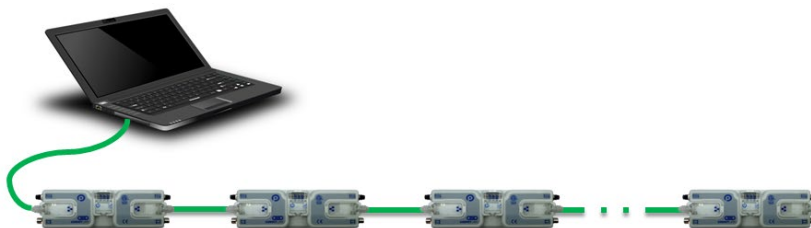


ConveyLinx-Ai2 User's Guide

Version 1.5

July 2019



Publication ERSC-1006

***ConveyLinx module firmware and functionality is protected by U.S. and international patents.
For complete patent information visit www.pulseroller.com/patents***

GLOSSARY OF TERMS

Carton	A separate (usually wrapped or boxed) object to be transported by the conveyor. The terms tray , tote , load , or product may also be used interchangeably in this document
ConveyLinx	Conveyor controls architecture based upon modular distributed devices connected via Ethernet network
ConveyLinx-Ai / ConveyLinx-Ai2	Conveyor control module that is part of the ConveyLinx family. Each module can accommodate up to 2 MDR conveyor zones . The modules allow connection for Senergy-Ai platform motor rollers and gear drives. The term Module will be used within this document and will refer to the <i>ConveyLinx-Ai2</i> device
DHCP	Dynamic Host Configuration Protocol A protocol for assigning IP addresses to devices on a network from a pool of available IP's . A dynamic IP address changes each time the device connects to the network
Hall Effect Sensor	Special sensor embedded within the brushless DC motor of an MDR used to provide motor rotor position feedback to the motor controller
M8	This is the type of a connector, which has four connector pins and is used on the ConveyLinx Ai2 modules for both sensor connectors and MDR connectors
LED	Light Emitting Diode – In the context of this document, LED's are used on the ConveyLinx-Ai2 to provide visual indication of module status
Light / Dark Energized	Term used to describe how the signaling output circuit of a photo-sensor is configured when it detects its reflected light. A photo-sensor that is light energized will activate its output circuit when it detects its reflected light. A dark energized photo-sensor will activate its output circuit when it does not detect its reflected light
MDR	Motorized Drive Roller or Motor Driven Roller - Brushless DC motor and gearbox assembly integrated into a single conveyor roller
Normally Open / Normally Closed	Control logic terminology to define the state of the output of a Boolean “on” or “off” device. The term specifically describes the state of the output circuit when the device’s sensing circuit is un-energized. In the context of photo-sensors ; a normally open wired sensor would have its output circuit energized when it detected its reflected light and its output circuit would be de-energized when it did not detect its reflected light. Conversely a photo-sensor wired normally closed would energize its output circuit when it did not see its reflected light and it would de-energize its output circuit when it did detect its reflected light
NPN / PNP	Electronics term that indicates the type of transistor circuit used for a logical input or output for controllers. NPN devices will provide a common or ground connection when activated and a PNP device will provide a logic voltage connection when activated

Photo-sensor	A device, mounted near the end of the conveyor zone to sense the presence of a carton on the zone
PLC	Programmable Logic Controller – A wide variety of industrial computing devices that control automatic equipment
PWM	Pulse Width Modulation – a control scheme that utilizes high speed switching transistors to efficiently deliver power in a controlled fashion from the ConveyLinX-Ai2 controller to MDR
Retro-reflective / Reflex	<p>Term used to describe the two basic types of photo-sensors. Retro-reflective photo-sensors utilize a reflective target that must be aligned with the photo-sensor such that the light emitted by the photo-sensor is reflected back to it</p> <p>Reflex (or sometimes known as proximity) type photo-sensors emit light to be reflected back from an object located sufficiently close to the sensor</p> <p>For both types of photo-sensors, when they detect their reflected light source, their signaling output circuit changes state</p>
IP54	The IP Code (International Protection Marking) specifies the device's degree of resistance to intrusions, dust and water. IP54 certified device must be fully protected from splashed water, dust particles and completely protected from contact
RJ-45	Registered Jack Style 45 – Standard connector / receptacle format utilizing 8 pin connections. The typical standard for computer network cable connections
Singulation Release	Conveyor control method for zoned controlled conveyor that dictates that when a zone is discharging its carton , the upstream carton waiting to enter must wait until the discharged carton is completely clear before it can enter
Senergy-Ai	PulseRoller brand proprietary motor control platform that provides electronic intelligence inside the motor that can be read by ConveyLinX-Ai and ConveyLinX-Ai2 control modules. The connection from the motor to the controller is via 4-Pin M8 style connector
Slave Rollers	A set of non-motorized conveyor rollers mechanically linked to an MDR . The MDR and slave rollers make up a physical zone . All of the slave rollers in a zone rotate at the same speed and direction as the MDR because of their mechanical linkage
TCP/IP	Transport Control Protocol / Internet Protocol - IP is the protocol which oversees the transmission of information packets from device to device on an Ethernet network. TCP makes sure the packets have arrived and that the message is complete. These two protocols are the basic language of the Internet and are often referred to together as TCP/IP
Train Release	Conveyor control method for zone configured conveyor that dictates that when a zone is discharging, the upstream zone's carton can move in unison with the discharging carton

Zone	A basic (linear or curved) cell of the conveyor consisting of a set of slave rollers driven by one or more MDR's and a single photo-sensor
ZPA	Zero Pressure Accumulation – Term that describes the conveyor controls and mechanical scheme that will cause cartons to queue on a conveyor in discrete zones such that cartons do not touch each other

SYMBOL CONVENTIONS



This symbol indicates that special attention should be paid in order to ensure correct use as well as to avoid danger, incorrect application of product, or potential for unexpected results



This symbol indicates important directions, notes, or other useful information for the proper use of the products and software described herein.

IMPORTANT USER INFORMATION

ConveyLinx-Ai2 modules contain ESD (Electrostatic Discharge) sensitive parts and components. Static control precautions are required when installing, testing, servicing or replacing these modules. Component damage may result if ESD control procedures are not followed. If you are not familiar with static control procedures, reference any applicable ESD protection handbook. Basic guidelines are:



- Touch a grounded object to discharge potential static
- Wear an approved grounding wrist strap
- Do not touch connectors or pins on component boards
- Do not touch circuit components inside the equipment
- Use a static-safe workstation, if available
- Store the equipment in appropriate static-safe packaging when not in use



Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes, and standards



The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any installation, Insight Automation Inc. does not assume responsibility or liability (to include intellectual property liability) for actual use based on the examples shown in this publication



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SUMMARY OF CHANGES

The following table summarizes the changes and updates made to this document since the last revision

Revision	Date	Change / Update
1.0	June 2016	Initial Release
1.1	January 2017	Added Appendix E
1.2	February 2017	Added connection diagrams for Sensor Port Aux I/O
1.3	March 2017	Corrected Figure numbering, clarified Flex Zone and Train release modes
1.4	October 2017	Updated Appendix B – IOX-2 wiring diagrams and schematic
1.5	July 2019	Misc. typographical and EasyRoll graphics updates

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SUMMARY OF HARDWARE CHANGES

The following table summarizes the changes and updates made to this document since the last hardware revision.

Hardware Revisions		
Revision	Date	Change / Update
1.0	June 2016	Initial Release

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PREFACE

WHO SHOULD USE THIS MANUAL?

This manual is intended for users who need basic product information and simple application procedures to implement *Modules* to control simple linear conveyor.

You should have a basic understanding of electrical circuitry and familiarity with relay logic, conveyor equipment, photo-sensors, etc. If you do not, obtain the proper training before using this product.

PURPOSE OF THIS MANUAL

The purpose of this manual is to:

- Identify the components and ports available on a module
- Provide guidelines for proper installation and wiring
- Provide examples on basic inter-module connections for linear conveyor
- Introduce the *EasyRoll* software tool and provide instructions to configure and modify parameters.

NOT INCLUDED IN THIS MANUAL



Because system applications vary; this manual assumes users and application engineers have properly sized their power distribution capacity per expected motor loading and expected operational duty cycle. Please refer to conveyor equipment and/or motor roller manufacturer's documentation for power supply sizing recommendations.

INTRODUCTION TO CONVEYLINX®

CONVEYLINX® CONCEPT

ConveyLinx control system as applied to conveyor control is a series of individual *Modules* interconnected via standard Ethernet cabling to form an integrated solution for MDR (Motorized Drive Roller) conveyor functionality. Each *Module* can accommodate up to 2 Senergy Ai MDRs and 2 photo-sensors to provide control for up to 2 conveyor zones. Each *Module* also includes convenient connectivity ports for upstream and downstream Ethernet network cabling.



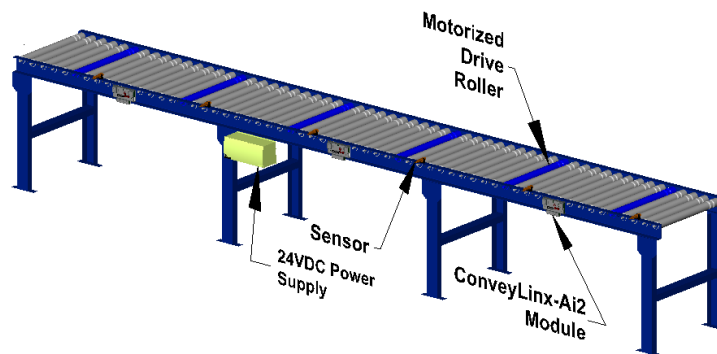
FIGURE 1 - CONVEYLINX® CONCEPT WITH CONVEYLINX-AI2 MODULES

Modules can be easily software configured to operate multiple zones of linear conveyor with the *EasyRoll* software. Also, with the *ConveyLinx EasyRoll* software tool; each *Module's* default configuration can be modified to customize functionality for specific applications.

CONVEYLINX® SYSTEM COMPONENTS

The following are the typical components required for a *ConveyLinx* controlled conveyor installation:

- ✓ *ConveyLinx-Ai2* modules
- ✓ MDRs – one or two per *ConveyLinx-Ai2*
- ✓ Photo-sensors – one or two per *ConveyLinx-Ai2*
- ✓ 24VDC Power Supplies



CONVEYLINX-AI2 MODULE FEATURES

Each individual *Module* has the following features:

- ✓ Built-in Ethernet switch
- ✓ Modular M8 (female) style connection ports for photo-sensors
- ✓ Modular M8 (male) style connectors for MDR
- ✓ 24VDC power connection with separate power supplies for logic and motors
- ✓ Context-sensitive multi-color LED indicators
- ✓ Thermal and over-current protection for MDR
- ✓ Automatic light/dark operate detection for photo-sensor inputs
- ✓ Accommodates PNP or NPN type photo-sensor
- ✓ Proportional / Integral (PI) MDR speed regulation
- ✓ Three MDR braking method options
- ✓ Adjustable acceleration and deceleration capability
- ✓ IP54 compliant

CONVEYLINX® CONTROL SYSTEM FEATURES

When one or more *Modules* are installed and configured, there are several operational and configurable features of the *ConveyLinx* control system that are accessible by the *EasyRoll* software package. Some of these features are:

- ✓ Single zone to zone zero pressure accumulation (ZPA) control once module is configured.
- ✓ Optional configuration for *Train Release* and *Gap Train Release* modes.
- ✓ Automatic *Flexible Zone Recognition* logic to detect and handle carton sizes exceeding the length of one physical zone.
- ✓ Optional configuration for *Look Ahead Slow Down* mode for higher speed applications.
- ✓ Ability to bridge separate Ethernet sub-networks for seamless operation.
- ✓ Ability to designate a *Module* to be an "Extension" to another *Module* such that it operates as simple motor controller.

The first sections of this manual will describe in detail the hardware and connectivity requirements for *Modules* and the software configuration procedures for simple linear conveyer installation.

The latter sections of this manual will describe in detail the usage of the *EasyRoll* software package to gain access to the various optional configuration parameters and utilities.

CONVEYLINX-AI2 MODULE HARDWARE OVERVIEW

Modules are designed to be installed and integrated into the conveyor’s mechanical side frame assembly. Please refer to *Appendix A – Module Dimensions* page 103 for module dimensions and mounting details.

The *Module* is a controller for up to 2 Motorized Drive Roller (MDR) conveyor zones. Each *Module* provides connection points for 2 MDR units with their corresponding 2 photo-sensors as well as upstream and downstream network and discreet interconnections to form a complete control system for zoned MDR conveyors.

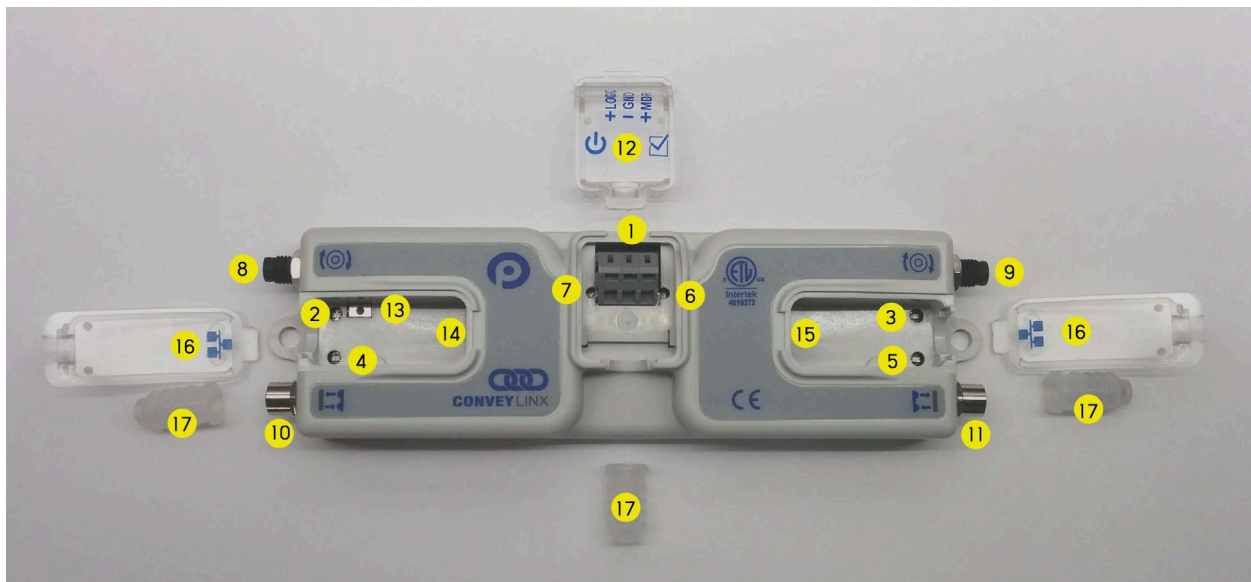


FIGURE 2 – CONVEYLINX-AI2 MODULE HARDWARE FEATURES IDENTIFICATION

Item	Description
1	24VDC Power Terminals with separate connections for Logic and Motors
2 & 3	Motor Left LED & Motor Right LED – Motor status indicators
4 & 5	Left Sensor & Right Sensor Status LED Indicators
6	Module Status LED Indicator
7	Module Power LED Indicator
8 & 9	Motor Left and Motor Right - 4-pin M8 style connector for MDR connection
10 & 11	Sensor Left and Sensor Right – M8 style connector for zone photo-sensor connection
12	Removable IP54 Power Compartment Cover
13	Module Replacement Button
14 & 15	Link Left and Link Right – RJ-45 style Ethernet network connection between modules including LED Indicators
16	Removable IP54 Ethernet RJ-45 Port Compartment Cover – Left and Right
17*	IP54 Protection Shrouds for Ethernet cabling and power wiring

* Indicates items shipped unattached to the module but included in the module’s box



The “left” and “right” naming convention for the module ports is based upon facing the module as shown and is not to be confused with direction of product flow on the conveyor. Product flow will be designated as “upstream” and “downstream”

HARDWARE CONNECTIONS

MOTOR LEFT AND MOTOR RIGHT PORTS

Both ports utilize a 4-pin M8 male receptacle. Each receptacle is mechanically keyed to assure proper orientation upon plugging in.

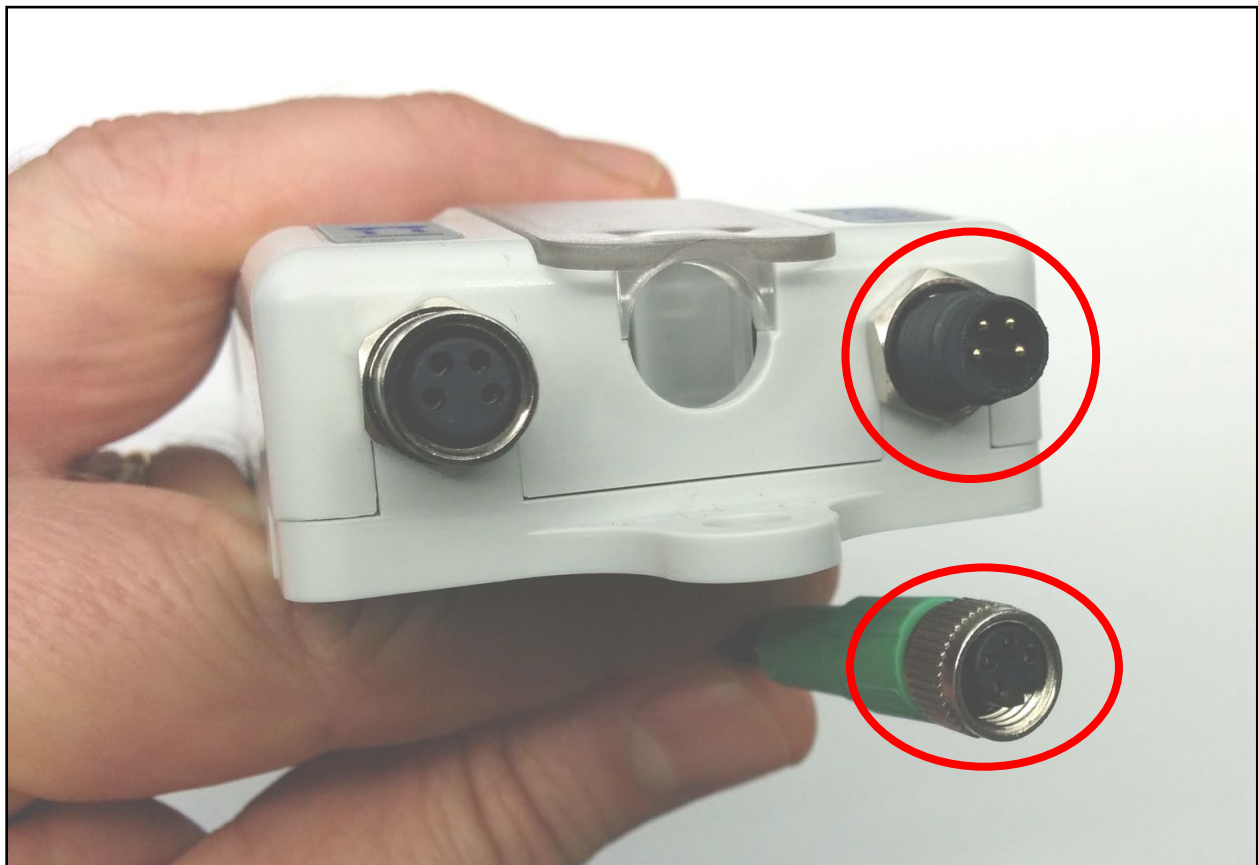


FIGURE 3 - M8 MALE RECEPTACLE AND SENERGY-AI2 FEMALE CONNECTOR

SENSOR LEFT AND SENSOR RIGHT PORTS

Each sensor port is a standard M8 Female receptacle with the following pin-out:

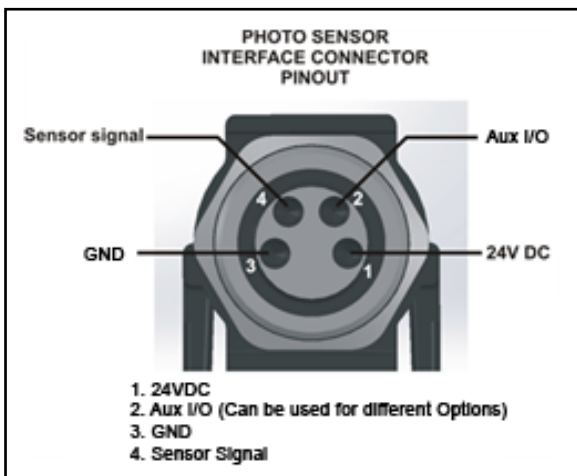


FIGURE 4—CONVEYLINX SENSOR PORT DIAGRAM

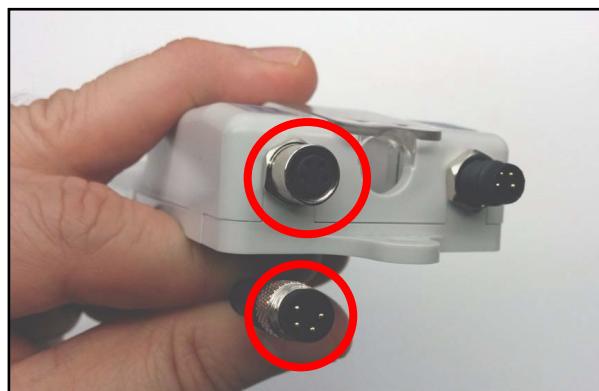


FIGURE 5 – MODULE FEMALE SENSOR PORT AND MATING SENSOR'S MALE CONNECTOR

The signals are defined by the following chart:

Pin	Signal	Description
1	24V DC	Module 24VDC Supply
2	Aux I/O	I/O Signal – Function configured with <i>EasyRoll</i> software
3	GND	Module DC Common
4	Sensor Signal	Logical Input for Sensor's state output – Auto detect for NPN or PNP

ELECTRICAL CONNECTIONS FOR SENSOR PORT AUX I/O

When connecting to either Sensor port with an M8 connector to access Pin 2 signal; you typically will use a standard parallel type splitter cable assembly that breaks out each of the available pins on the Module to their own M8 connection port. These splitter cables wire the +24V and Common connections in parallel. The typical usage is shown in *Figure 6*.

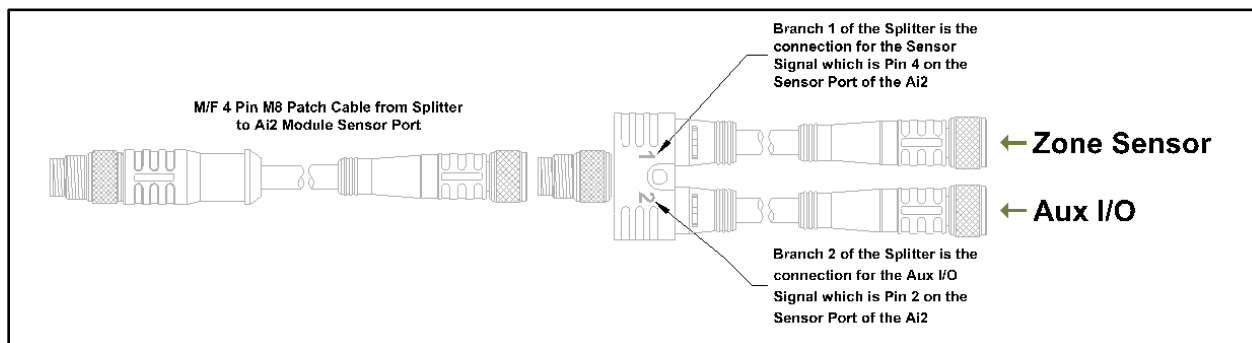


FIGURE 6 - TYPICAL PARALLEL SPLITTER CABLE USAGE

See Sensor Port Aux I/O Pin 2 Usage beginning on page 92 for details on using EasyRoll to configure the function of Aux I/O Pin2 and refer to Appendix B - IOX-2 Breakout Module on page 105 for additional Aux I/O options

AUX I/O PIN2 AS INPUT

When the Aux I/O Pin 2 is configured as an input, the circuit is NPN/PNP auto-sensing. The signal can be connected to either +24V or 0V to operate as shown in Figure 7.

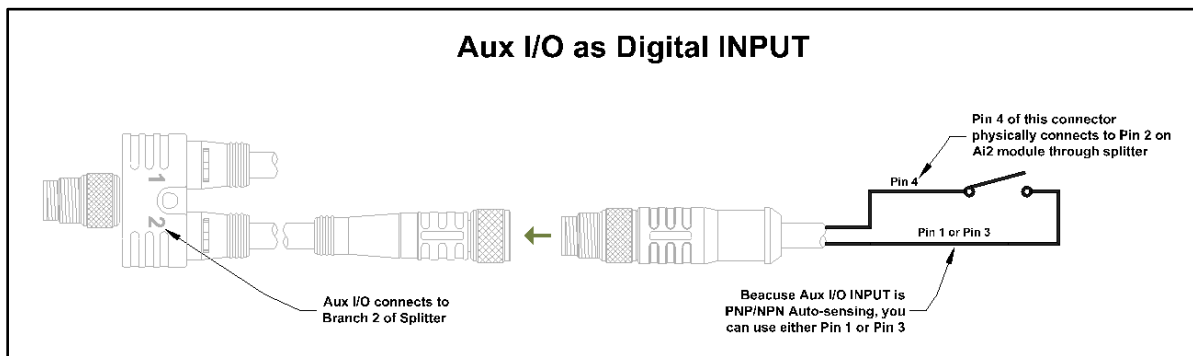


FIGURE 7 - AUX I/O PIN 2 INPUT CONNECTION DIAGRAM



Because the auto-sensing circuit requires a nominal voltage in order to operate, there will be some small amount of leakage current possible between Module Pin 2 and Pin 3 (GND). Please use caution if you connect a load between Module Pin 2 and Pin 3.

AUX I/O PIN 2 AS OUTPUT

When the Aux I/O Pin 2 is configured as an output, the circuit is NPN only and requires the load to be connected to Pin 1 (+24V) as shown in Figure 8.

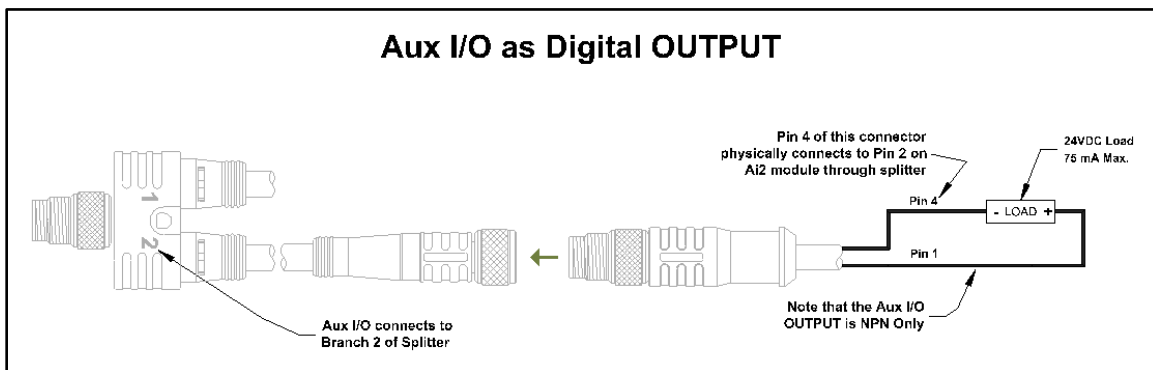


FIGURE 8 - AUX I/O PIN2 OUTPUT CONNECTION DIAGRAM

ETHERNET LEFT AND ETHERNET RIGHT PORTS

Both ports are standard RJ-45 jacks conforming to standard Ethernet connection pin-out. In order to maintain IP54 rating; Ethernet cables need to be equipped with protective shrouds. *Figure 9* shows Ethernet cables installed using shrouds to protect the RJ-45 connectors on the Ethernet cables. Each module is shipped with 3 shrouds.

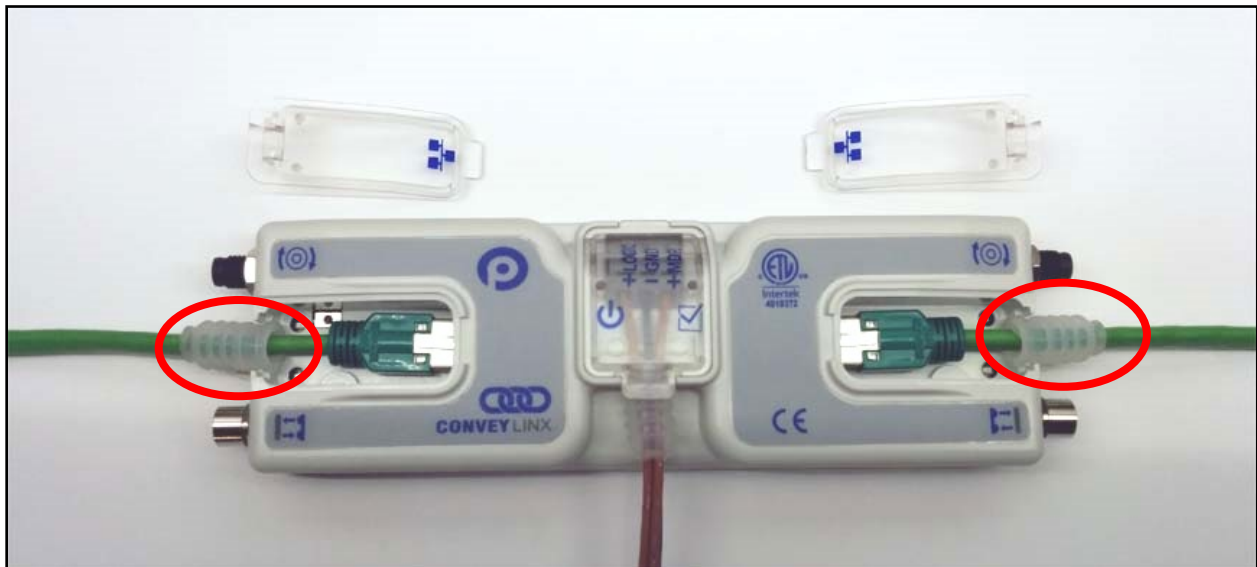


FIGURE 9 – MODULE WITH LEFT & RIGHT ETHERNET CABLES (COVERS REMOVED)

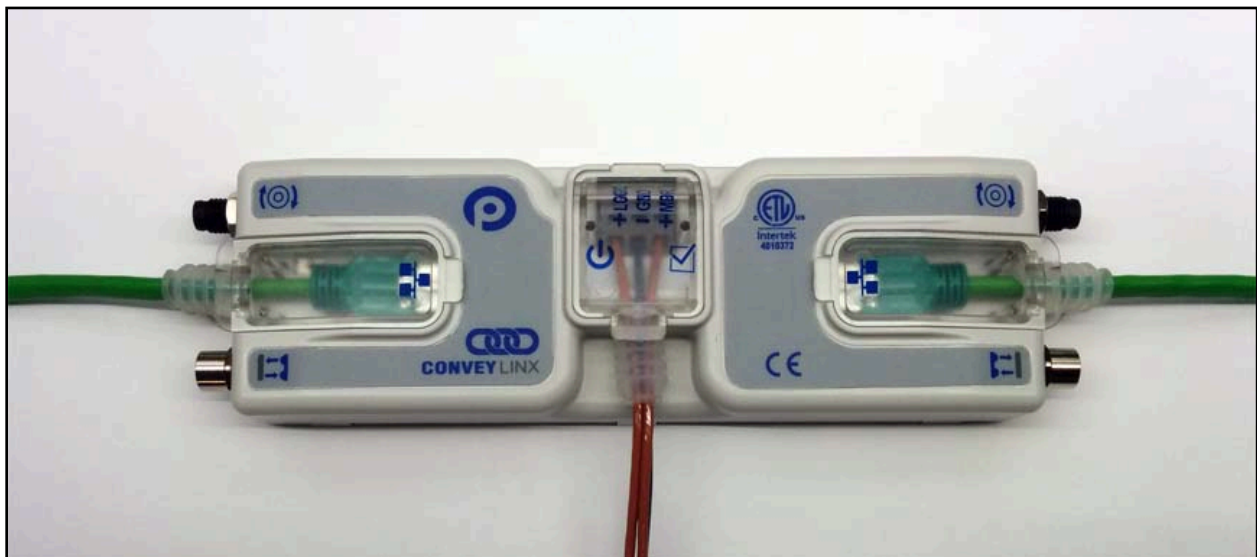


FIGURE 10 - ETHERNET CABLES CONNECTED WITH COVERS ATTACHED

IP54 protective shroud requires a special tool to properly install the shroud onto the RJ-45 connector. *Figure 11* shows Phoenix Contact item 2891547 FL IP 54 Assembly Tool.

This tool must be purchased separately



FIGURE 11 - PHOENIX CONTACT ETHERNET SWITCH 2891547 FL IP 54 ASSEMBLY TOOL



FIGURE 12 - PROTECTIVE SHROUD PLACED ON TOOL



FIGURE 13 - SHROUD STRETCHED WITH TOOL



FIGURE 14 - INSERTING RJ-45 END THROUGH SHROUD

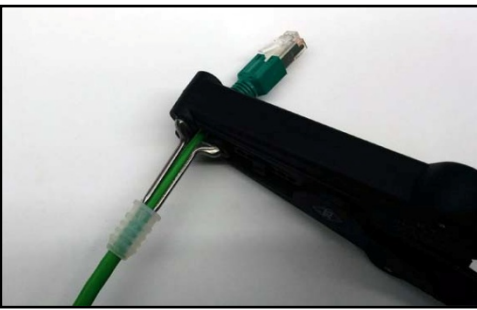


FIGURE 15 - SHROUD REMOVED FROM TOOL PINS



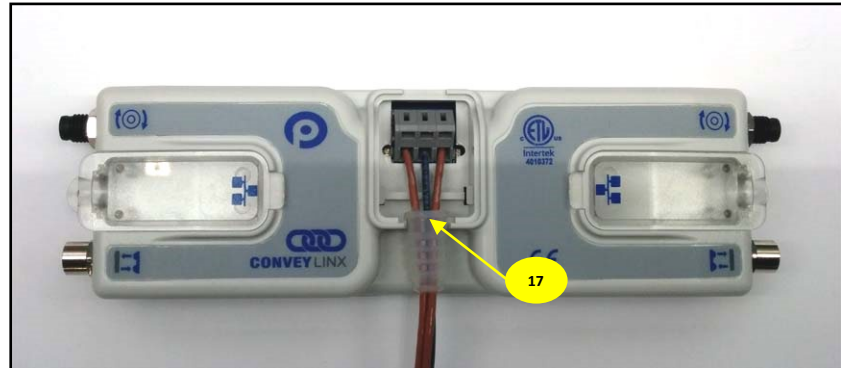
All Ethernet cables for connections between modules are recommended to be shielded. Failure to use shielded cables may result in data loss and unexpected results. Shown above are Ethernet cables with sealing shrouds which are required for IP54 compliance.

POWER CONNECTIONS

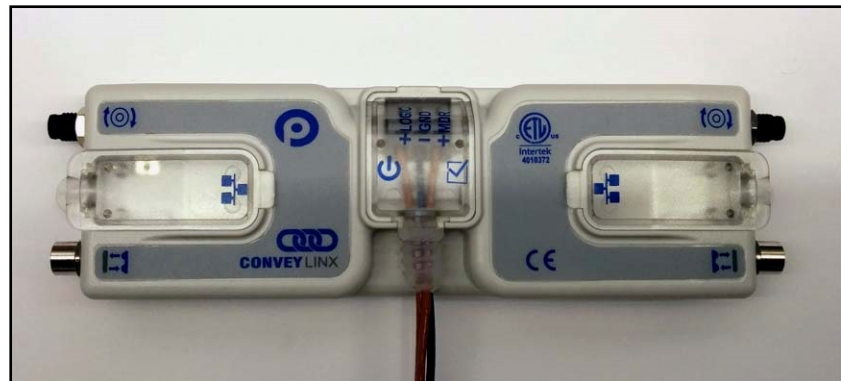
IP54 INSTALLATION

Item 17 as depicted in *Figure 2* may be unattached to the module when shipped and are included in the module's shipping box. These items are used to maintain an IP54 installation of the power and Ethernet wiring.

Power wires are fed through the protective shroud (Item 17). The wire terminals are standard cage-clamp style.



Once wiring has been completed the power wiring compartment is then sealed by snapping into place the Power Compartment Cover (Item 18).



LOGIC AND MDR POWER

The *Module* is designed to allow for separate power connections for module logic and motor power so that these can be powered by separate power supplies. For example, the motor power supply can be switched off by an emergency stop control system so that all motors have power removed. With the motor power separately switched off; the logic power supply can remain on so that the module's communications can remain active and report status to networked supervisory control system(s). *Figure 17* shows a diagram for separate logic and MDR power supplies and *Figure 16* shows a diagram for a single power supply for both logic and MDR power. Note that powering the MDR terminal also powers the Logic.

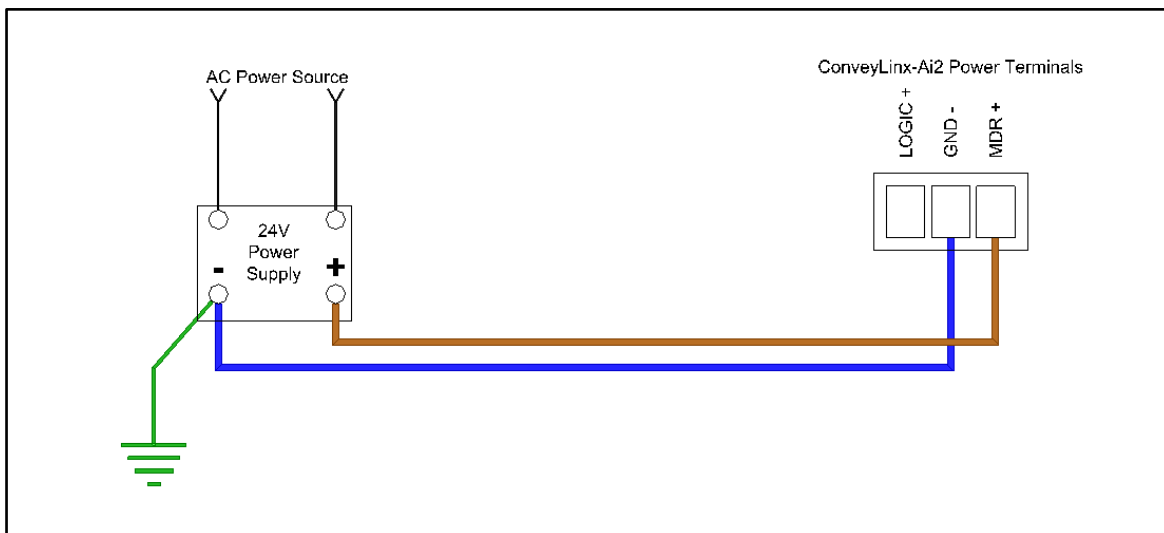


FIGURE 16 - CONNECTION FOR SINGLE MDR AND LOGIC POWER SUPPLY

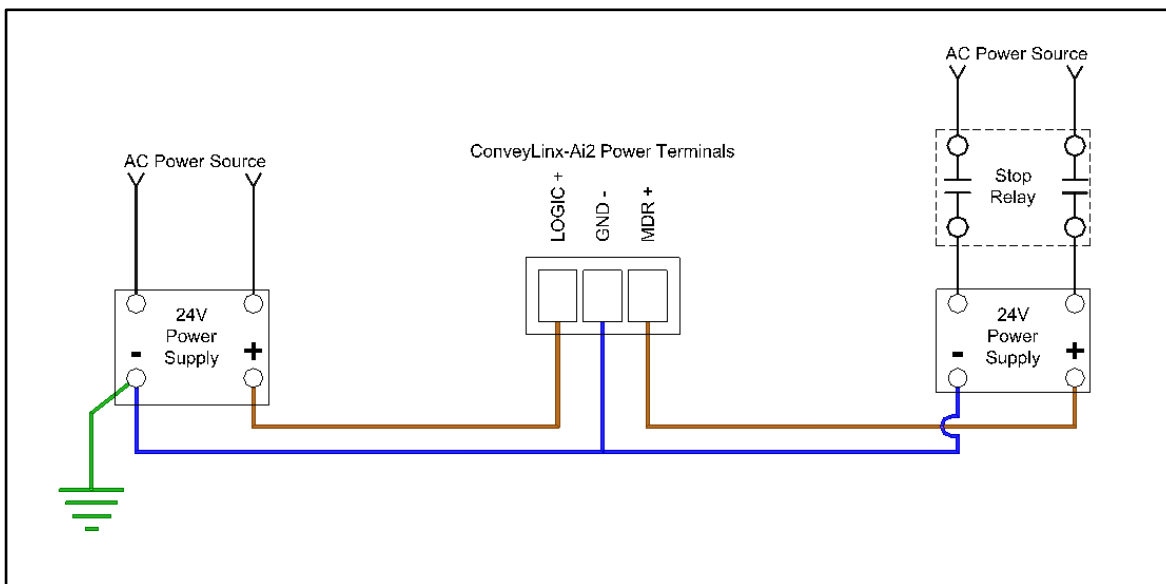


FIGURE 17 - TYPICAL CONNECTION FOR SEPARATE MDR AND LOGIC POWER SUPPLIES

POWER SUPPLY COMMON GROUNDING

Whether logic and MDR are powered together or separately; the DC common (“-“) connections on all power supplies should be connected together. One of the power supplies should have its DC common connected to ground. Avoid connecting more than one power supply DC common to ground because this can lead to unintended grounding loops. *Figure 18* and *Figure 19* show single and separate power supply connections respectively and their DC common connections and grounding connection.

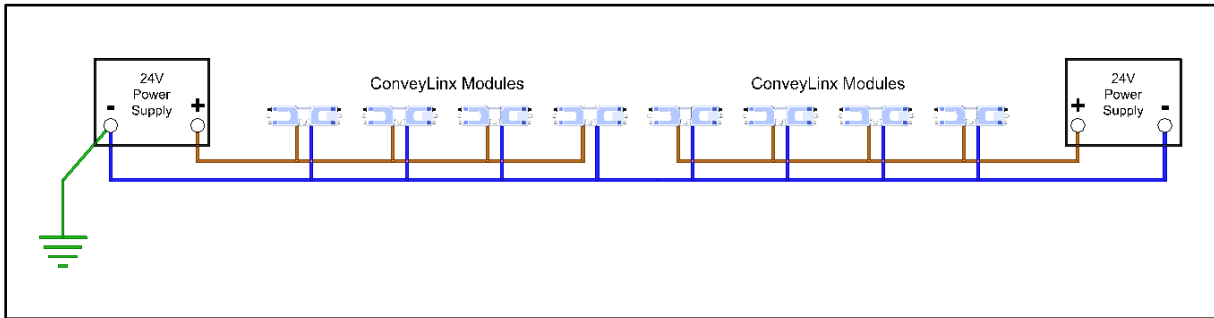


FIGURE 18 – SINGLE POWER SUPPLY CONNECTION WITH DC COMMONS TIED TOGETHER AND TO GROUND

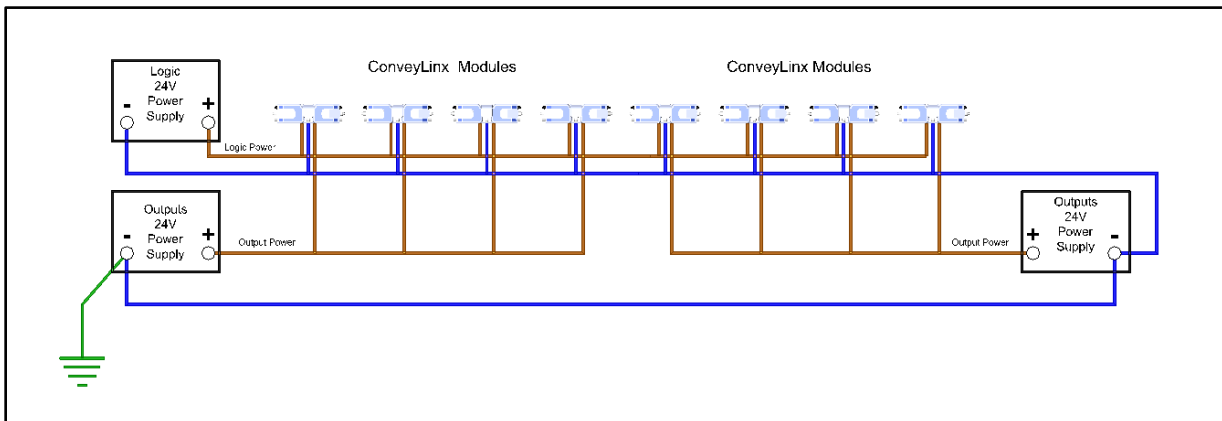


FIGURE 19 - DUAL POWER SUPPLY CONNECTION WITH DC COMMONS TIED TOGETHER AND TO GROUND

Please refer to Appendix E – Power Supply Loading on page 121 for additional information



This document assumes the user is aware of MDR power requirements for the application and that the user and/or installer have properly sized 24VDC power supplies and wiring based upon all applicable codes and standards. This document also assumes installation will follow proper equipment grounding practices. “DC common or -” on all power supplies should always be connected to ground. Improper power supply sizing and/or improper grounding practices may produce unexpected results.

CONNECTIONS FOR LINEAR CONVEYOR

For linear conveyor operation, *Modules* are designed to undergo an Auto-Configuration Procedure which is performed utilizing the *EasyRoll* software tool.



Further description and application examples of Ethernet networked solutions are included in separate Insight Automation publication *ConveyLinX Ai Developer's Guide* (publication ERSC-1510).

Before the Auto-Configuration Procedure can be performed; each individual *Module* needs to have its associated MDR's and photo-sensors connected in the proper way for expected operational results.

In general, each *Module* detects which *Sensor* ports have a device connected and will use this to determine its specific configuration once it has been instructed to self-configure by the Auto-Configuration Procedure.

Before starting to configure your system to operate, each MDR and photo-sensor needs to be properly connected to the *Modules* mounted on the conveyor. *Modules* will determine how to operate based upon how the photo-sensors and MDR's are connected.

A single *Module* can operate as a:

- 2 zone controller with 2 MDR's and 2 photo-sensors
- 1 zone controller with 1 MDR and 1 photo-sensor
- 1 zone controller with 2 MDR's and 1 photo-sensor

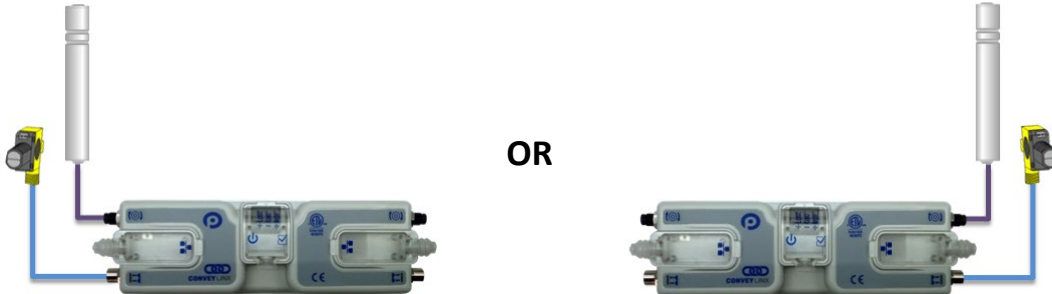
The following examples illustrate these connections.

EXAMPLE 1 – TWO ZONE CONTROLLER

In this example an MDR and photo-sensor is connected to both the Left and Right group of ports. The module will control the 2 MDRs as independent logical conveyor zones.

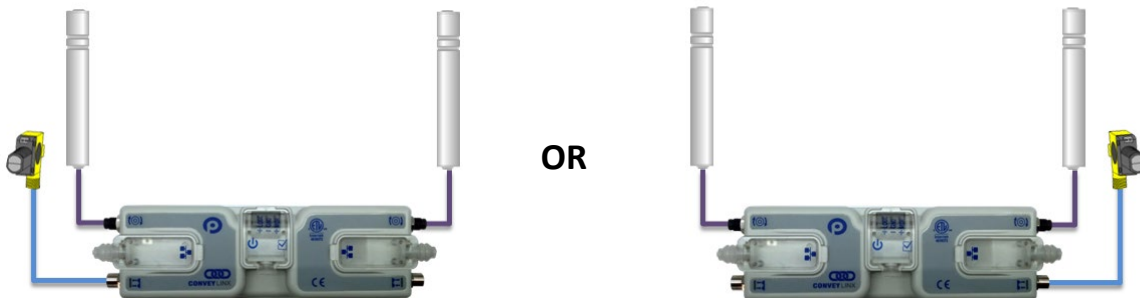


EXAMPLE 2 – SINGLE ZONE CONTROLLER



In this example, a single MDR and photo-sensor is connected to either the Left or Right group of ports. The module controls the MDR as a single independent logical conveyor zone.

EXAMPLE 3 – DUAL MDR SINGLE ZONE CONTROLLER



In this case the *Module* will control 2 MDR's in tandem and operate as a single zone with a single photo-sensor connected to either the Left or Right port. This configuration is typical for belted zones used particularly on inclined conveyors which require the added torque of a second MDR to accommodate the conveying carton.

INVALID ZPA CONFIGURATION EXAMPLES

Because the *Module* determines its self-configuration intention by how photo-sensors are connected; it is possible to connect photo-sensors and MDR's in invalid ways for ZPA function that will produce unexpected results.



Please note that in the examples shown below, the device plugged into the sensor port is intended to function as a zone sensor for ZPA mode with its output connected to Pin 4 of the port. Each of these invalid configurations will not cause the Auto-Configuration function to fail and module addressing and connections will be properly made. These configurations are valid for users who will later place these modules in PLC I/O mode after Auto-Configuration has completed.



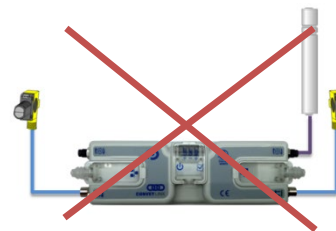
OR



In these cases, the module will try to act as a Single zone conveyor control, but the MDR's are not plugged into same Left/Right port group as the photo-sensors.



OR



In these cases, the *Module* will try to act as a two-zone conveyor control but only one MDR is connected.

These are only "Invalid" if you are trying to operate these modules in ZPA mode. These configurations are valid for PLC I/O Mode

MOTOR DIRECTION DEFINITION

The *Module* uses a Clockwise (CW) and Counter Clock-Wise (CCW) motor rotation definition. The reference for this distinction is based upon viewing the MDR from the cable exit end of the roller as depicted below in *Figure 20*.

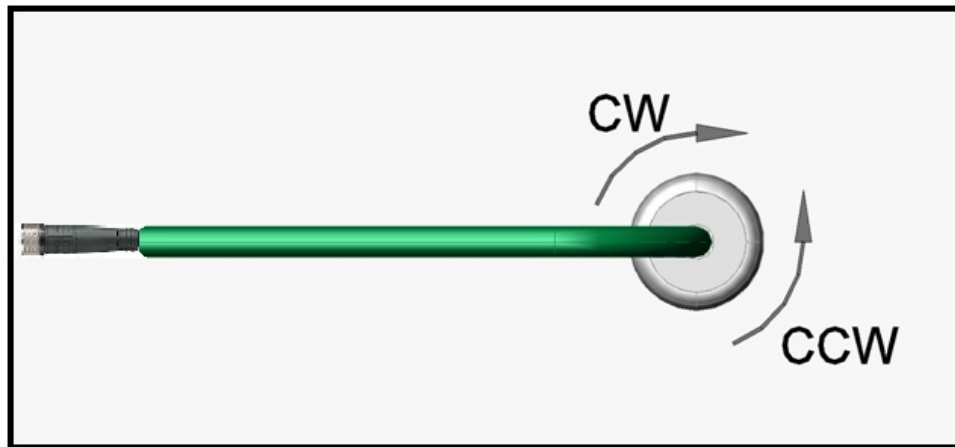


FIGURE 20 - MOTOR ROTATION DIRECTION CONVENTION

STATUS INDICATORS

Module status is indicated by several LED's. All LED's except for the Ethernet Link and Activity LEDs are multi-coloured and context sensitive. The following chart indicates the various meanings of all *Module* LED indicators. Please refer to *Figure 2* on page 15 for the item number locations on the module. By definition *Blinking* is approximately ½ second on/off cycle and *Flashing* is approximately ¼ second on/off cycle.

COMMUNICATIONS

Indicator	Item	LED State	Description
Ethernet Left Link & Ethernet Right Link	14 & 15	OFF	No connection established
		Solid Green	Connection is established
		<i>Blinking</i> Green	When data transmission activity is occurring

NETWORK & MODULE FUNCTION

Indicator	Item	LED State	Description
Module Status	6	<i>Blinking</i> Red	<i>Module</i> is starting task processes
		<i>Blinking</i> Green	<i>Module</i> is ready
		<i>Flashing</i> Green & <i>Blinking</i> Red	Failsafe Mode
		<i>Flashing</i> Red	Auto Configure Mode is active
		<i>Blinking</i> Amber	Connection to peer lost or performing firmware upgrade check
		Solid Amber	Firmware upgrade in progress

MOTOR INDICATORS

Indicator	Item	LED State	Description
Motor Left & Motor Right	2 & 3	OFF	Motor is not running, and no faults detected
		Solid Green	Connection is established
		Solid Red	<ul style="list-style-type: none"> If Motor is running, indicates current limit If Motor is stopped, indicates motor is not connected properly or is overheated Power supply is under 18V or above 30V
		<i>Blinking</i> Red	Motor is overloaded and <i>Module</i> is limiting current to reduce temperature
		<i>Flashing</i> Red	Motor short circuit detected between at least two of the phase windings or Motor Power Supply less than 10V
		Solid Amber	Module booting up
		<i>Slow Blinking</i> Red	Profinet enabled discover function initiated from PLC

SENSOR INDICATORS

Indicator	Item	LED State	Description
Sensors	4 & 5	Solid Amber	<i>Module</i> is booting up
		Solid Green	Sensor Input energized
		<i>Flashing Green</i>	When in ZPA Mode: When Sensor is blocked, indicates external device (PLC/PC controller or <i>EasyRoll</i>) has accumulated the zone and inhibiting release
		Solid Red	Aux I/O Pin 2 energized (when configured as Input)
		<i>Blinking Red</i>	Arrival Jam or missing sensor
		<i>Blinking Green/Amber</i>	Sensor Jam
		<i>Flashing Red</i>	Network Stop Condition
		<i>Flashing Amber</i>	Power Supply is under 10V
		<i>Slow Blinking Red</i>	Profinet enabled discover function initiated from PLC

POWER INDICATOR

Indicator	Item	LED State	Description
Power	7	Solid Blue	Power supply for both logic and motors are connected
		<i>Blinking Blue</i>	Motor's power is under 18V

SPECIAL CASES

Indicator	Item	LED State	Description
All Sensor and Motor	2 & 3 4 & 5	<i>Flashing Red</i>	Module in stopped state
Left Sensor & Left Motor	2 & 4	<i>Flashing Green</i>	ZPA Zone on left side of Module is in Maintenance Mode*
Right Sensor & Right Motor	5 & 5	<i>Flashing Green</i>	ZPA Zone on right side of Module is in Maintenance Mode*

*Maintenance mode only accessible via remote PLC. Please refer to *ConveyLinx-ERSC PLC Developer's Guide* (publication ERSC-1506).

AUTO-CONFIGURATION OF LINEAR CONVEYOR

The purpose of Auto-Configuration for networked *ConveyLinx* controls is to provide a simple and easy procedure for linear conveyor system commissioning. The Auto-Configuration of Linear Conveyor feature of *ConveyLinx* requires the use of the *EasyRoll* on a PC connected to the most upstream module of the linear network.

LINEAR CONVEYOR DEFINITION

Auto-Configuration is only applicable to a **Linear Conveyor** arrangement. A Linear Conveyor arrangement is defined as a single uninterrupted path of conveyor with no merge or diverts mechanisms. A Linear Conveyor can include curved sections, but the flow of cartons on the conveyor is continuous from in-feed zone to discharge zone.

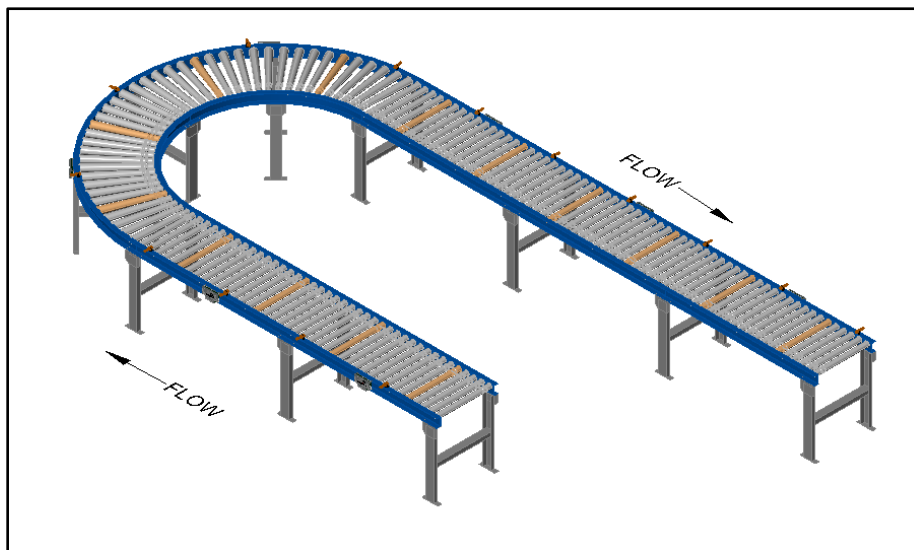


FIGURE 21 - SIMPLE LINEAR CONVEYOR EXAMPLE

A networked *ConveyLinx* solution can control more complex conveyor paths that include diverting and merging equipment. Simple merging control can be accomplished with our *ConveyMerge* functionality as described in publication ERSC-1005 *User's Guide Supplement for ConveyMerge*. Diverting functionality will require either external PLC/PC control and/or on-board *ConveyLogix* programming. Please refer to publications ERSC-1506 *ConveyLinx Ai2 Developer's Guide* and ERSC-1200 *ConveyLogix Guide* for more details.

INSTALLING EASYROLL TOOL ON YOUR PC

The files for *EasyRoll* will be typically sent or downloaded in a compressed (i.e. “.zip”) format. Once you have extracted the contents of the compressed file; the result will be a folder named with the format “EasyRoll_Vx_nn” where x is the main version number and the nn is the revision level. Inside this folder is a file named “Setup.exe”. Double click this file to begin the install procedure. *EasyRoll* installs like any standard Windows application and you will be prompted for typical Windows prompts. By accepting the defaults for the prompts; *EasyRoll* will install on your local *Operating System* drive under the “\Program Files (x86)\Industrial Software\EasyRoll\” or “\Program Files\Industrial Software\EasyRoll\”.

CONVEYLINX ETHERNET DEFINITION



Please refer to [Appendix C—Configuring PC for Ethernet Subnets](#) for pre-requisite information on understanding Ethernet network I.P. addresses and Subnet concepts. Further description in this section assumes you have a general knowledge level of I.P. addressing and subnets.

All *Modules* communicate over Ethernet network and use TCP/IP based protocols for normal function. All TCP/IP protocols require that each device on a network have a unique I.P. address assigned to it in order to function properly.

An I.P. address is in the format of: AAA.BBB.CCC.DDD where AAA, BBB, CCC, and DDD are numerical values between 0 and 255.

For the purposes of *ConveyLinx*; the AAA.BBB.CCC portion of the I.P. address taken together is defined as the **Subnet**. The DDD value of the address minus 19 is defined as the **Node**.

For example; if a *Module* has an I.P. address of “192.168.25.20” then its *Subnet* address is “192.168.25” and its *Node* is “1”

At the factory, every *Module* is assigned a temporary I.P. address that is used by automated testing equipment and fixtures so that every *Module* is verified prior to shipment. When a *Module* is taken “out of the box” it will still have this I.P. address stored in its memory.

When the *Auto-Configuration Procedure* is initiated; one of the many things that occur is that each module is automatically assigned a new I.P. address. This I.P. address for all modules is determined by the **Subnet** of the I.P. address already stored inside whichever *Module* is selected as the *Auto Configuration Master*. Even if all downstream modules from the *Auto Configuration Master* have the same or different *Subnet* or *Node* values; these downstream modules will have their *Subnet* changed to the existing *Subnet* of the *Auto Configuration Master*. Furthermore, when the *Auto Configuration Procedure* occurs; the *Auto Configuration Master* will also have its **DDD** value changed to **20**. All downstream *Modules* will then have their *DDD* values automatically set beginning with 21.

Figure 22 shows 4 Modules installed “out of the box” onto the conveyor. Once the *Auto Configuration Master* is identified and the *Auto-Configuration Procedure* is performed; all 4 Modules will have their I.P. address configured as shown in Figure 23.

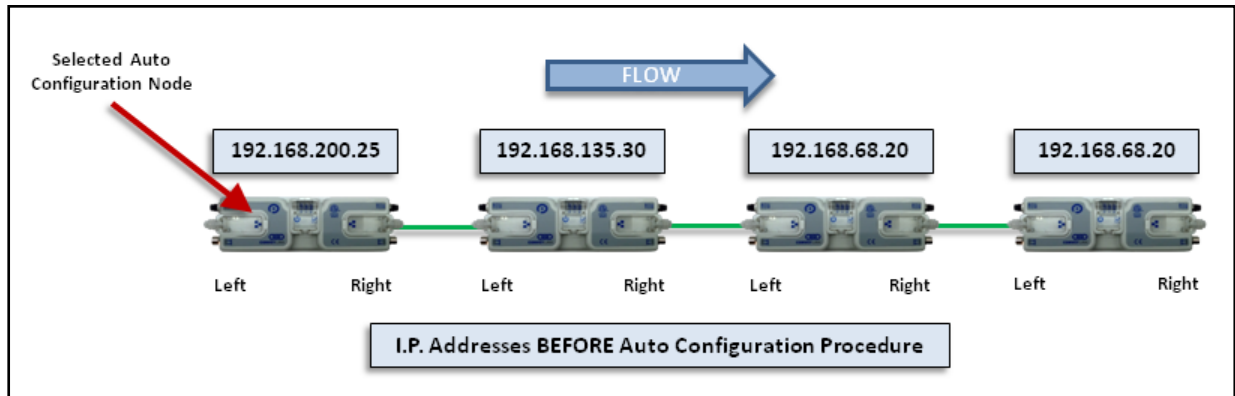


FIGURE 22 - IP ADDRESSES BEFORE AUTO-CONFIGURATION

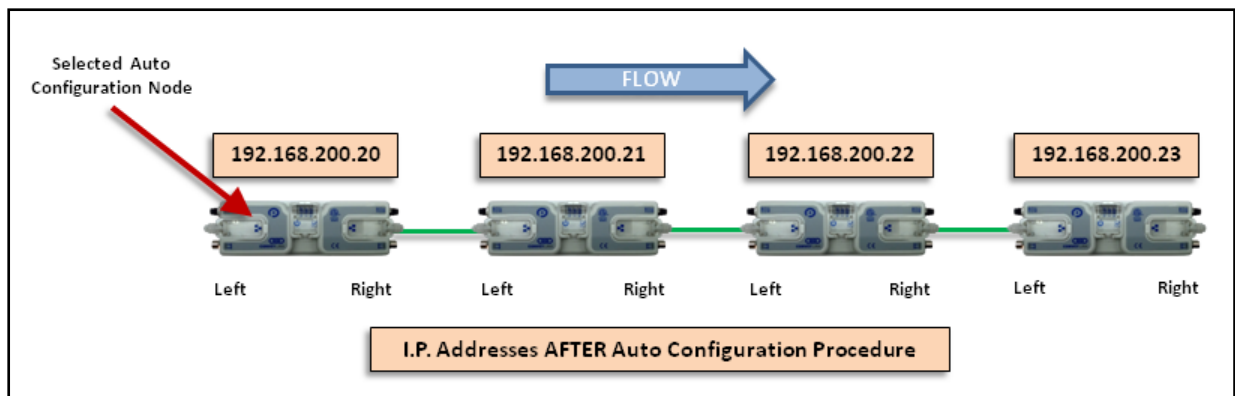


FIGURE 23 - IP ADDRESSES AFTER AUTO-CONFIGURATION

The *Auto-Configuration Procedure* will assign *Nodes* up to and including *Node 240*. Therefore, each *Subnet* is limited to 221 *Nodes*.

CONNECTING YOUR PC TO CONVEYLINX NETWORK

Using an Ethernet cable, connect your PC's Ethernet port to the *Auto-Configuration Master* as shown below in *Figure 24*

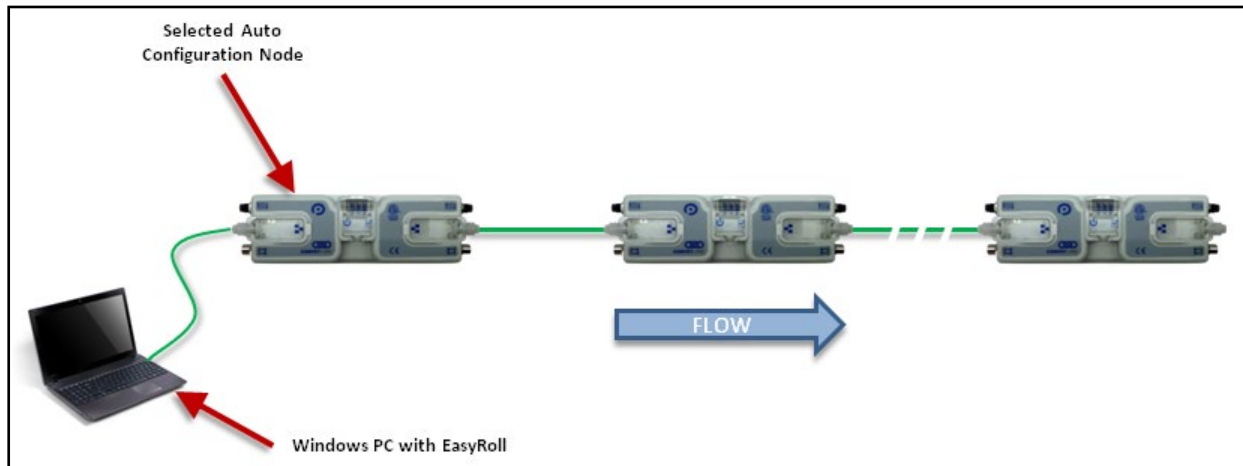


FIGURE 24 - INITIAL PC CONNECTION TO CONVEYLINX SUBNET



It is highly recommended to connect the PC directly to the ConveyLinX network. Avoid trying to connect via Ethernet switches or wireless router/switches. If a wireless switch is not setup properly then the Discover Feature will not work. Also ensure that network firewall is turned off for proper discovery.

AUTO-CONFIGURATION PROCEDURE

The direction of flow of the conveyor dictates how to begin the Auto-Configuration procedure. The *Module* located at the most upstream or in-feed end of the conveyor is defined as the **Auto-Configuration Node**. The Auto-Configuration procedure is initiated from the *Auto-Configuration Node*. Because of its physical location on the conveyor path and physical location in the Ethernet connection chain; the *Auto-Configuration Node* will automatically connect to all downstream modules and set their I.P. address for communication. Then the routine automatically sets the direction of flow. The following is the procedure to follow:

1. Start *EasyRoll V4.04 or higher* and invoke the Advanced Dialog. In the pop-up panel select "Network Services" and click "Discover".
2. When the *Modules* appear in the module table, select the ones that you want to configure and click "ConveyLinX tree" as shown in *Figure 25*.
3. When the topology is drawn, select the *Module* from which you want to configure the line and click "Auto-Configure from selected node" as shown in *Figure 26*.
4. This starts the Auto-Configuration procedure which will spread to all subsequent *Modules* and configure the entire line.



For the Auto-Configuration to work properly, all loads, totes, product, containers, cartons, etc. must be removed from the entire conveyor path and all photo-sensors must be aligned and adjusted so that none are detecting that their respective zone is occupied. Failure to meet these conditions will produce unexpected results.



Please note that number of modules on a single Subnet is limited to 221.

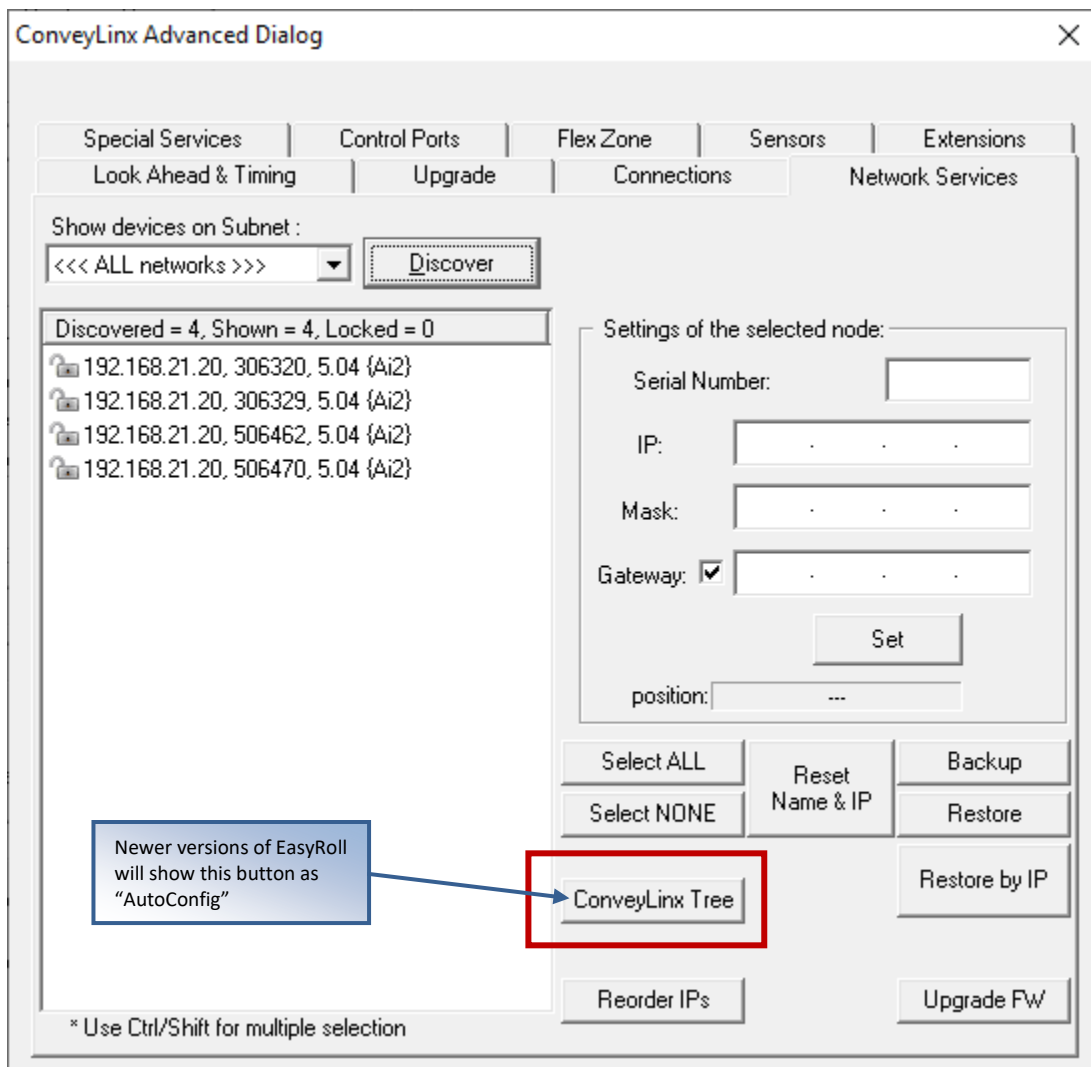


FIGURE 25 - DISCOVER PROCEDURE ON MODULES

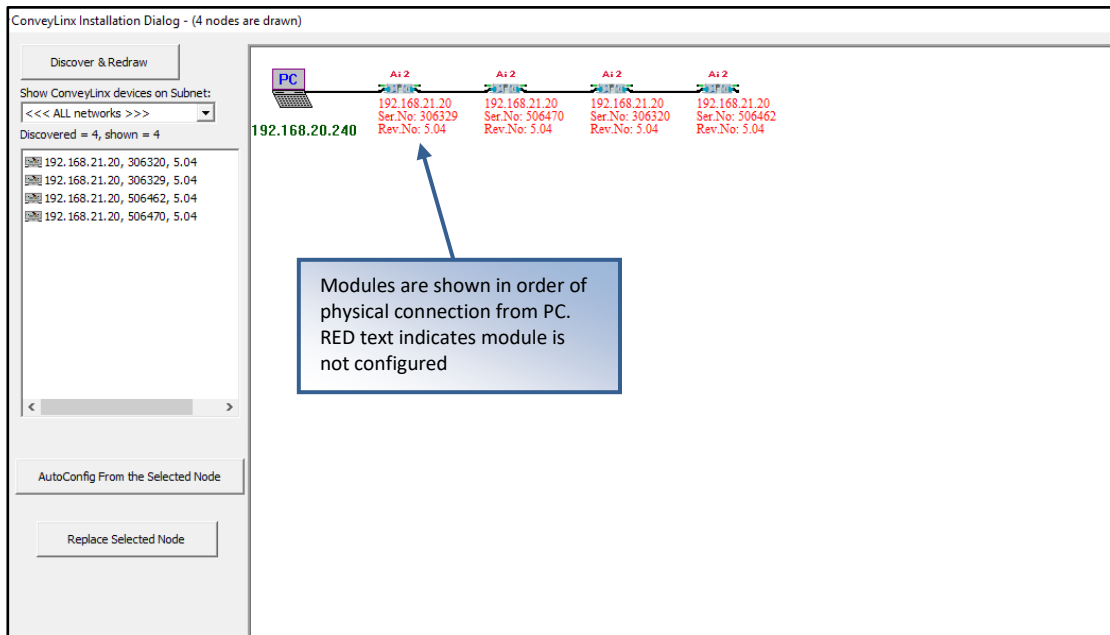


FIGURE 26 – TOPOLOGY VIEW AND INITIATING AUTO-CONFIGURE FROM THE SELECTED NODE

Note that the detail information in the topology view for each module is shown in RED when the module is unconfigured. You can also select the module graphic from the topology view and right click to show the context menu and initiate the Auto-Configuration from there as shown in *Figure 27*.

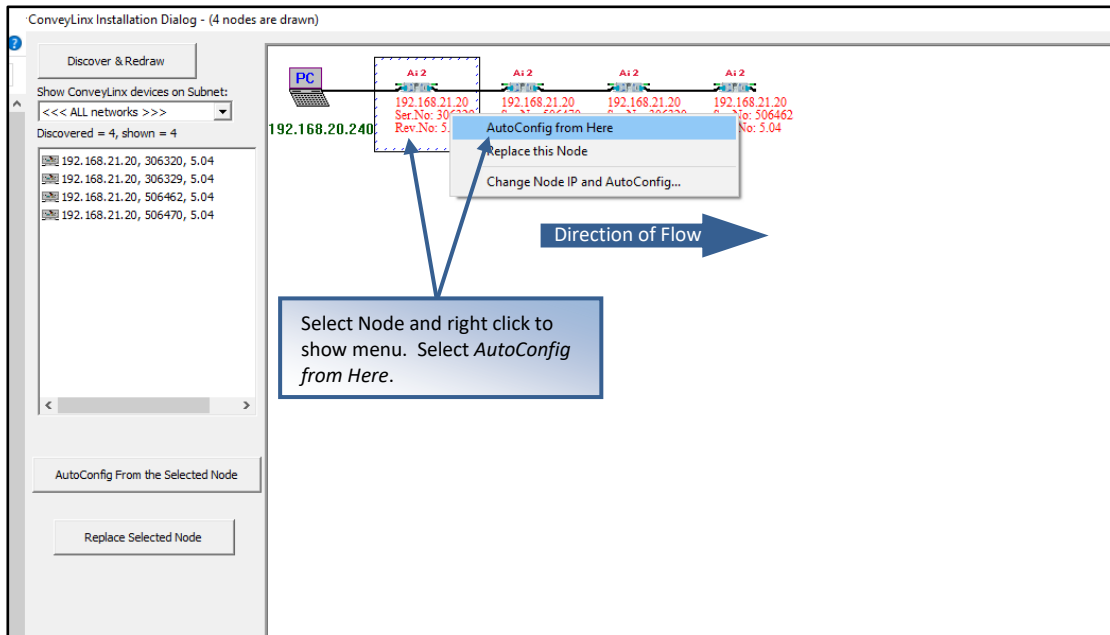


FIGURE 27 - AUTO-CONFIGURE BY SELECTING NODE IN THE TREE VIEW

After a few seconds, the operation will be complete and the resulting Tree view will look like *Figure 28*

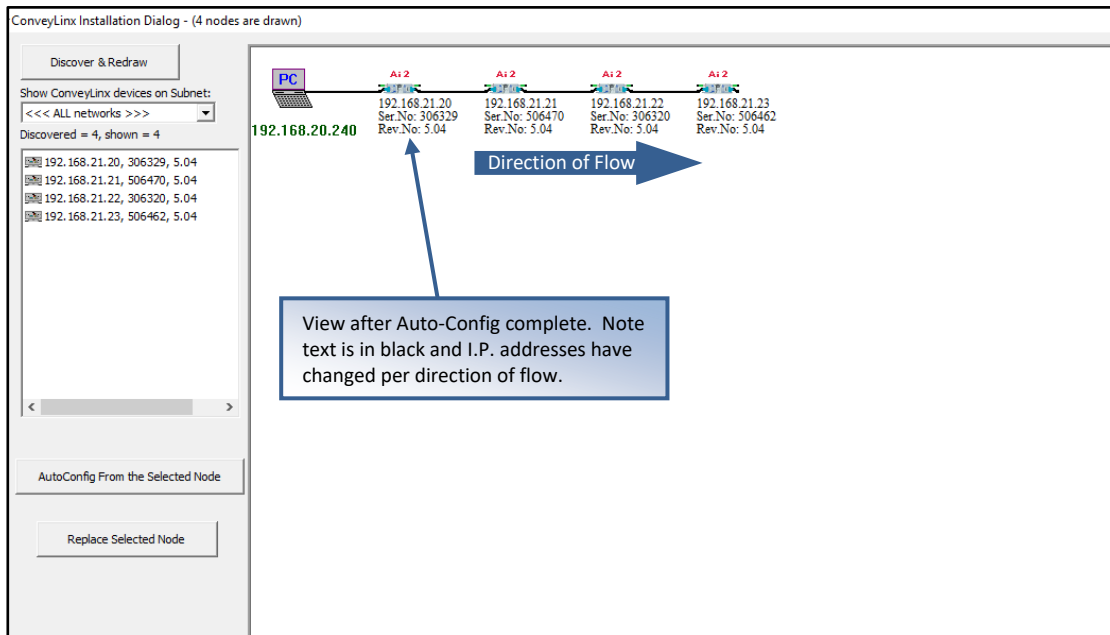


FIGURE 28 - TREEVIEW AFTER SUCCESSFUL AUTO-CONFIGURATION

The selected node for Auto-Configuration does not have to be the first module that is connected directly to the PC. The module at the other end of the detected line can also be selected as the Auto-Configuration master as shown in Figure 29.

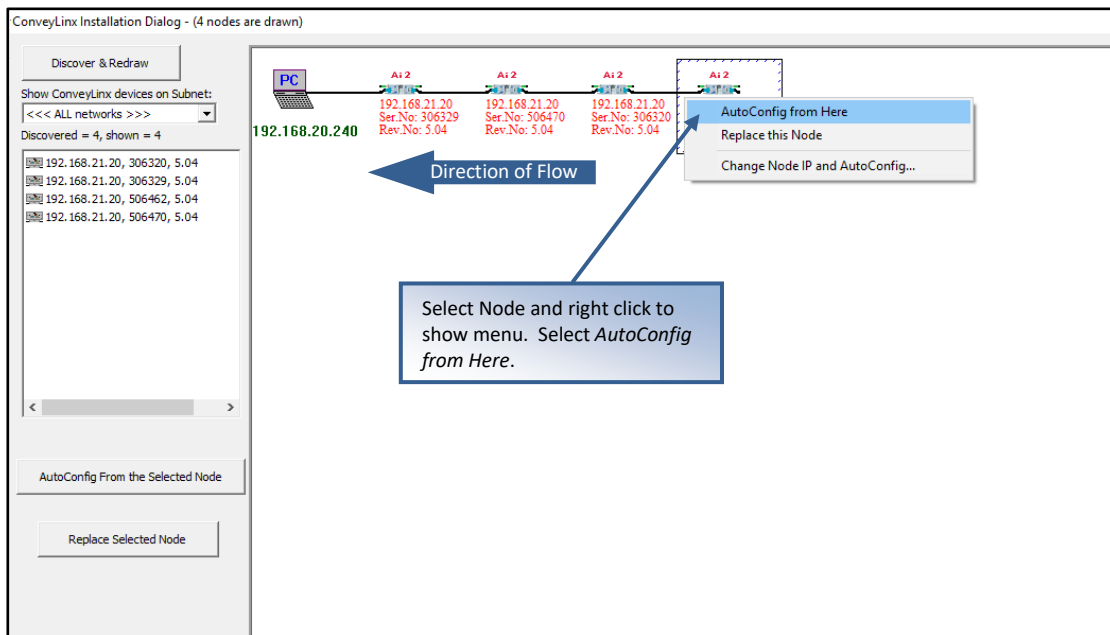


FIGURE 29 - AUTO-CONFIGURATION FROM THE FARTHEST NODE FROM THE PC

After a few seconds, the operation will be complete and the resulting Tree view will look like *Figure 30*

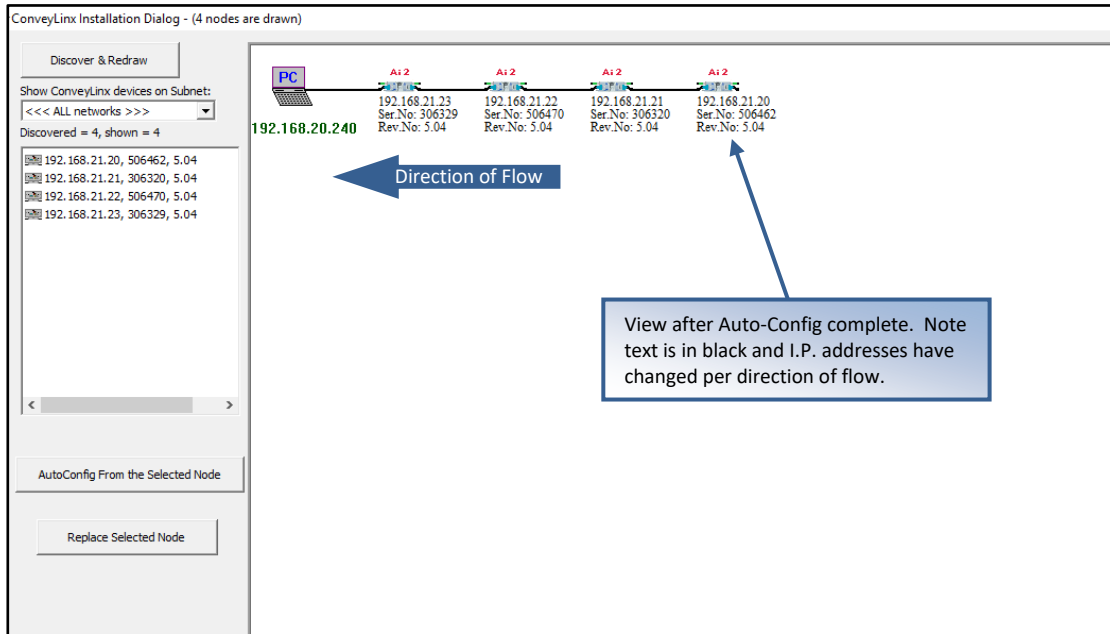


FIGURE 30 - TREEVIEW AFTER AUTO-CONFIGURATION IN OPPOSITE DIRECTION

AUTO DETECTION OF OPPOSITE SIDE MODULE LOCATION

The cable connections between Left and Right Ethernet ports can be used in situations where the *Module* must be mounted in the conveyor's opposite side frame. If properly connected, the Auto-Configure routine will detect this and configure the conveyor flow properly. *Figure 31* shows an example of opposite side location detection.

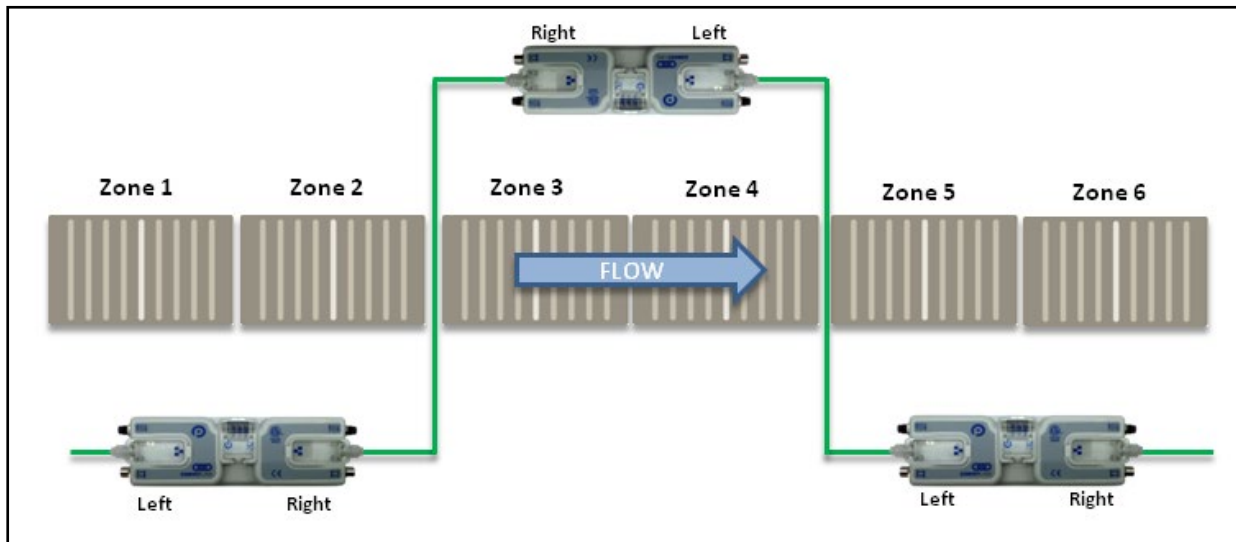


FIGURE 31 - OPPOSITE SIDE MODULE LOCATION EXAMPLE

AUTO CONFIGURATION RESULTS

NORMAL RESULTS

When the auto-configuration routine is complete, each *Module* will automatically reboot. When a *Module* has been successfully configured and rebooted, its *Module Status* LED will blink on and off green.



Please note that the time to complete the Auto-Configuration procedure is dependent on the number of modules being configured. Larger networks will take more time than smaller networks.

The topology view will show the module detail information in black text (no longer red) when the auto configuration is complete and successful as shown in *Figure 32*.

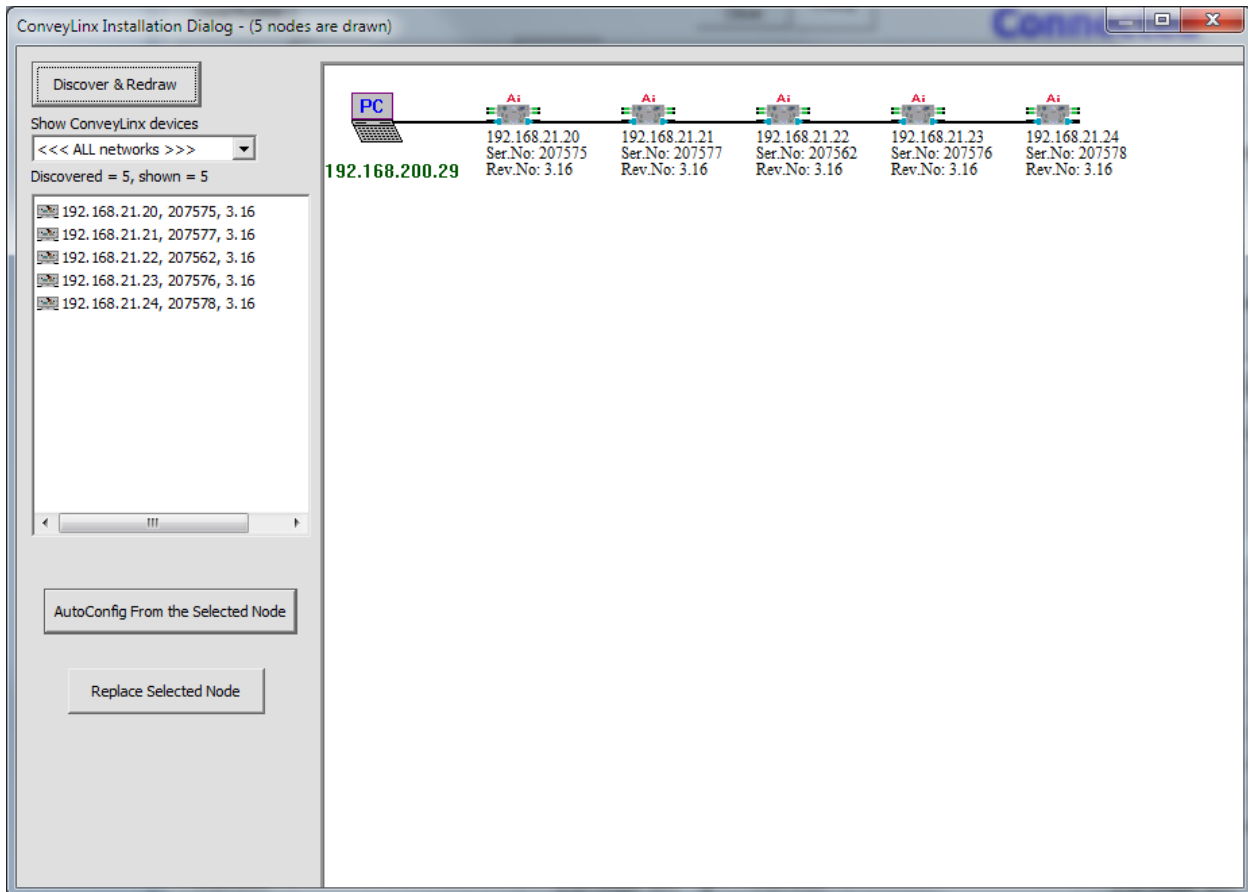


FIGURE 32 - AUTO-CONFIGURATION SUCCESS

If all *Module Status* LED's are blinking green; then to fully verify configuration is to place a single carton onto the most upstream zone and see that it conveys to the discharge zone. If it does, then the Auto-Configuration is successful. If it does not, then see section *Trouble-Shooting Failed Auto-Configuration* below.



Please note that once a network has been configured; attempting to again Auto-Configure any *Module* that is not the *Auto Configuration Master* will not initiate a new Auto Configuration procedure. The *Module* will detect that it is not the most upstream unit and abort the procedure. However, the *Module* will perform its local re-booting procedure. This procedure will take a few seconds to complete



TROUBLE-SHOOTING FAILED AUTO-CONFIGURATION

The following chart lists some typical failed condition indicators and actions to take for resolution.

Failed Condition	Action
<p>Status LED's OK with Unexpected Result</p>	<ul style="list-style-type: none"> • Check that all photo-sensors are operational and that all zones are clear and perform procedure again. • Check all networks, MDR, Sensor, and power connections and perform procedure again. • Verify that all connections are valid. Refer to section • <i>Invalid Configuration Examples</i> on page 27. Correct connections and perform procedure again.
<p>Status LED blinking or solid red on one or more modules</p>	<ul style="list-style-type: none"> • Verify that there are no Ethernet Switches or PC's connected between <i>Modules</i>. The Auto Configuration procedure will abort if a non-<i>ConveyLinx</i> device is detected along the path before reaching the last node. Modules up to that point will be configured, but the remaining modules will not. • When removing a <i>Module</i> from an existing network that is already operational; be sure to wait at least 2 minutes to allow the Ethernet switches on the remaining modules to reset before attempting a new Auto Configuration procedure.

DEFAULT SINGULATION RELEASE ZPA MODE

Loads will normally convey from upstream zone to downstream zone in singulation release fashion. A carton reaching last zone photo-sensor will cause last zone motor to continue to run to discharge the carton to the next conveyor or position.

In *Singulation Release Mode*, each zone waits until the zone in front of it is clear before it can run. This mode assures at least a zone-length of gap between cartons as they are being conveyed. When the first carton needs to stop and cause all those behind it to accumulate; the trailing cartons stop in their respective zones when their leading edge blocks the zone's photo-sensor. *Figure 33* shows a typical example of *singulation release*.

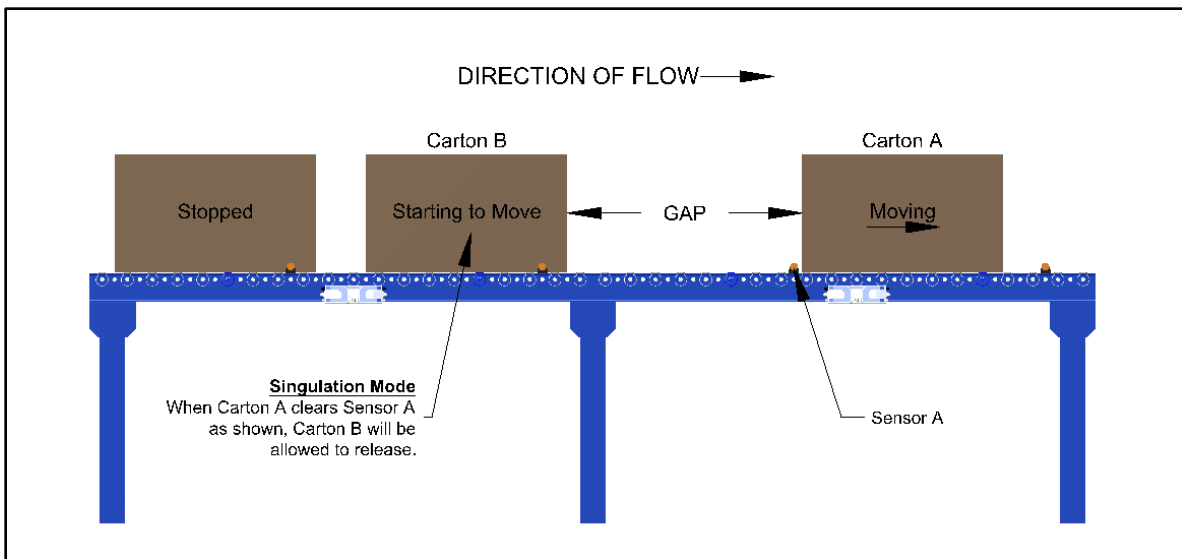


FIGURE 33 - SINGULATION RELEASE EXAMPLE

DEFAULT FLEX ZONE RECOGNITION FEATURE

Modules will automatically detect that a given carton is longer than one zone length and automatically adjust accumulation control so that the longer carton occupies two logical zones and will keep the next upstream carton from conveying into the longer carton.

Flex Zone mode only functions in singulation release mode.

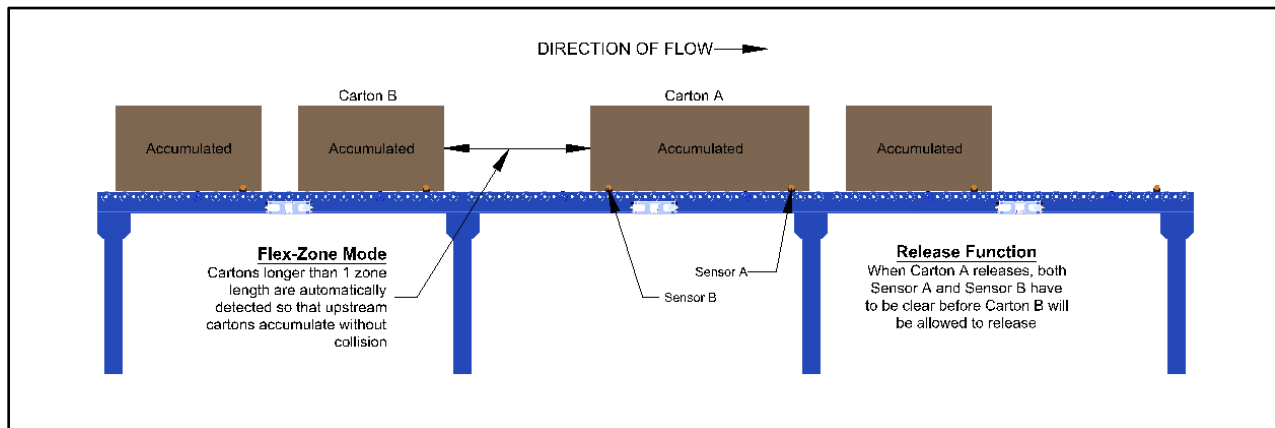


FIGURE 34 - TYPICAL FLEX ZONE MODE EXAMPLE



Please note that Flex Zone mode operates for carton lengths up to 2 zone lengths only. Operating conveyor system with cartons whose lengths are in excess of 2 zone lengths will produce undesirable results such as excessive detected jam conditions and faults.

JAM CONDITIONS

There are two (2) types of Jam conditions detected by the *Module*:

- Arrival Jam
- Sensor Jam

Both Jam conditions utilize a single *Jam Timer* that must expire for the condition to be active. Once either of these jam conditions becomes active; they will automatically clear in the logic after the *Auto Clear Time* has expired. Both the *Jam Time* and *Auto Clear Time* values are 5 seconds each by default. Please see section *Jam & Auto Clear Timers* on page 76 for details on how to change these values in *EasyRoll*.

ARRIVAL JAM

When a carton leaves an upstream zone and is conveyed to its next downstream zone, this upstream zone expects positive confirmation of carton arrival from the downstream zone. This communication occurs automatically along the *ConveyLinX* network. If a new carton arrives at this upstream zone while this upstream zone is waiting for a downstream arrival confirmation, the new carton will accumulate on this upstream zone. If the upstream zone does not receive this confirmation within the *Jam Timer* interval, the *Module* will produce an *Arrival Jam* fault. Once an *Arrival Jam* occurs, the *Module* will automatically hold any new carton at the upstream zone for a pre-determined *Auto Clear Time* timer value and then resume normal ZPA function. By default, the *Jam Timer* and the *Auto Clear Timer* values are set to 5 seconds each. This condition will be indicated on the corresponding Sensor LED on the module as shown on the chart in section *Sensor Indicators* on page 30.

SENSOR JAM

While a zone is releasing a *carton*; if this *carton* remains blocking the photo-sensor for the *Jam Timer* period (default of 5 seconds), the module will detect a *Sensor Jam*. This will be indicated on the corresponding *Sensor LED* on the module as shown on chart in section *Sensor Indicators* on page 30.

SENSOR JAM AUTO CLEAR PROCEDURE

After the *Sensor Jam* occurs and the sensor remains blocked; the *module* will attempt to perform the *Sensor Jam Auto Clear Procedure*. This is the procedure that the logic performs once the *Sensor Jam* has been detected:

1. Run the zone motor in reverse until the sensor is clear or 1 second has elapsed, whichever happens first
2. Wait for the Auto Clear Timer to expire
3. Run the zone motor forward to attempt discharge to the downstream zone (Attempt #1 complete)
4. If sensor is still blocked after discharge attempt, the zone motor runs in reverse until the sensor is clear or 1 second has elapsed, whichever happens first
5. Wait for the Auto Clear Timer to expire
6. Run the zone motor forward to attempt discharge to the downstream zone (Attempt #2 complete)
7. If sensor is still blocked after discharge attempt, the zone motor runs in reverse until the sensor is clear or 1 second has elapsed, whichever happens first
8. Wait for the Auto Clear Timer to expire
9. Run the zone motor forward to attempt discharge to the downstream zone (Attempt #3 complete)
10. If sensor is still blocked after Attempt #3, the sensor must be cleared manually to reset the Sensor Jam condition

Please note that if any of the discharge to downstream attempts (steps 3, 6, or 9) are successful, the *Sensor Jam* condition is automatically reset.



The 5 second Jam Timer and Auto Clear Timer values are default settings. Please refer to section *Jam & Auto Clear Timers* on page 76 for details on how to change these values with the *EasyRoll* software.



Please refer to section *Settings Check Boxes* on page 63 or the integrated help inside *EasyRoll* for help on changing the default logic to disable *Arrival Jam* detection and/or disable the *Auto Clear Time* delays.

NETWORK FAULT

In instances where Ethernet network connection is interrupted between *modules* while in operation, cartons will continue to convey and accumulate to the farthest downstream zone prior to where the network is interrupted. This farthest downstream zone will automatically accumulate the carton and not allow it to convey further downstream. Once network communications are re-established, the zone will return to normal operation.

LOW VOLTAGE FAULT

In instances when the *module* detects that its MDR supply voltage has dipped below 18VDC; the *module* will place its configured zone or zones into accumulation mode. The *module* will keep this state until it has detected that its MDR input voltage has risen to at least 21VDC.



Persistent unexplained momentary stopping or hesitations in normal zone to zone carton movement may be an indication of low voltage conditions. If this behavior is consistently observed; please verify voltage at farthest point from power supply and review power supply sizing and wiring practices to insure proper voltage at all modules.

Please refer to Appendix E – Power Supply Loading for details on power supply sizing

AUTOMATIC MODULE REPLACEMENT

Once a linear conveyor has been commissioned by the *Auto-Configuration Procedure*, the *modules* store configuration data about its upstream and downstream neighboring modules. This configuration data is automatically updated even if the linear conveyor has had its parameters modified by the *EasyRoll* software. The *Module* firmware uses this feature to allow for easy module replacement so that the entire linear conveyor does not have to be re-configured in order to replace a single *module*.



Automatic Module Replacement procedure will work to replace a module on systems with multiple subnets. You do not have to temporarily disconnect any network connections or otherwise isolate the subnet where the replacement procedure needs to occur.

MODULE REPLACEMENT PROCEDURE USING EASYROLL

1. Disconnect existing module's motor(s), network, photo-sensor(s), and power connections. The order of disconnection does not matter.
2. Connect new module's motor(s), sensor(s), network connections and power connections.
3. Start *EasyRoll V4.04* or higher. Invoke the *Advanced Dialog* and go to the *Network Services* tab, click on the *Discover* button. All modules in the network should be display. Click on *ConveyLinx Tree* button as shown in *Figure 25* . Topology of the ConveyLinx modules will be display in a few seconds.
4. Click on the *module* in the *Tree View* you want to add as the replacement *module*
5. Right-Click and select *Replace this Node* from the menu to begin the replacement process as shown in *Figure 35* . Note that you can also select the node from the list of modules on the left-hand side and then click the *Replace Selected Node* button.
6. Wait until *Module* performs its internal boot-up procedures which will be indicated when the Module Status LED blinks on and off green.

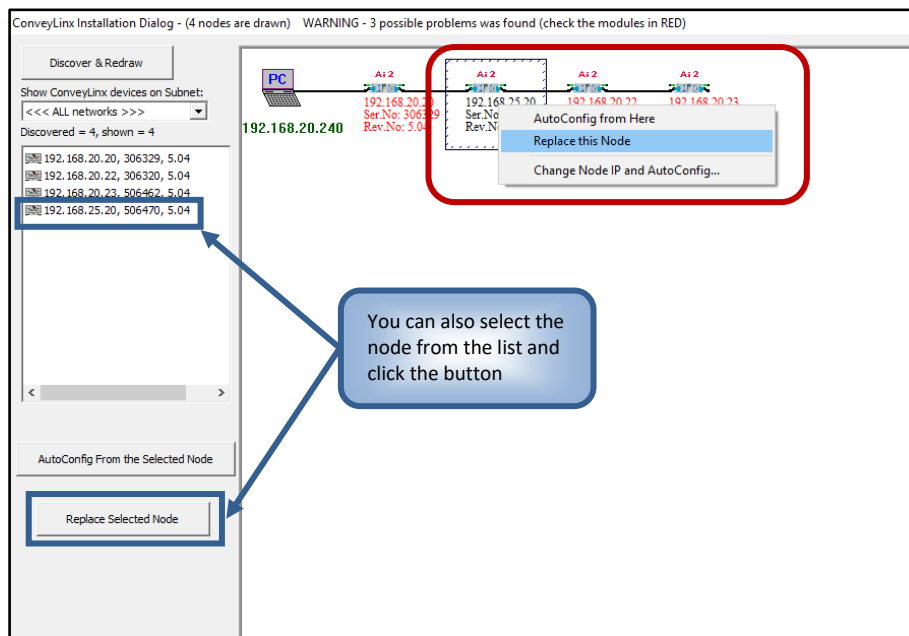
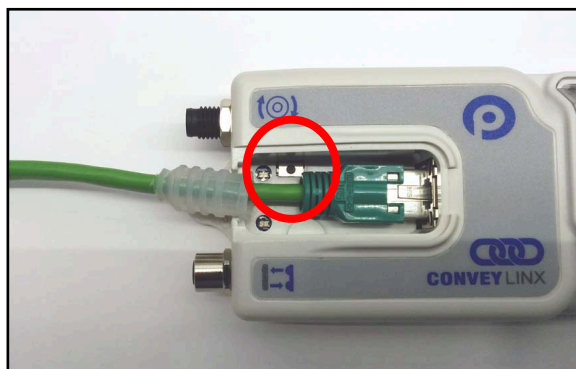


FIGURE 35 - TOPOLOGY VIEW AND REPLACING THE SELECTED NODE

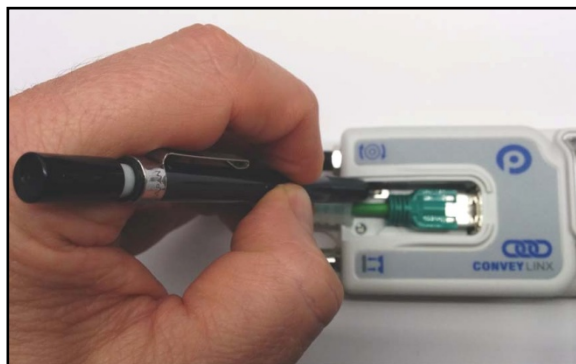
MODULE REPLACEMENT USING REPLACEMENT BUTTON

You can replace a single *Module* without using *EasyRoll* by utilizing the Replacement Button located inside the Left Ethernet cable connection compartment. Simply install the replacement module and connect all sensors, motors, network cables, and power connections. The procedure is illustrated below.

The *Module Replacement Button* is located in the Left Ethernet cable compartment. Remove the compartment cover to gain access to the button



With a pointed instrument (pencil or small screwdriver) press and hold the button for 2 seconds until the Status LED flashes red and then release the button.



Please note that the Module Replacement Procedure (either with *EasyRoll* or Replacement Button) can take a few minutes to complete. The replaced module will restart itself a minimum of 4 times during the procedure. It will restart 5 times if firmware is being upgraded or downgraded.

RESET TO FACTORY DEFAULT SETTINGS

There may be instances when you want to return a module to its “factory default” state. The procedure to do this is the following:

1. Unplug all sensors, devices, motors, and network cables such that the only thing connected is power
2. Press and hold the *Module Replacement Button* until the Module LED begins to flash
3. When the Module Status and Network Status LEDs both blink green, the procedure is complete

The following table lists the default values for the *ERSC* after reset procedure:

Item	Default Value or Setting
IP Address Settings	<ul style="list-style-type: none"> • IP: 192.168.21.20 • Subnet Mask: 255.255.128.0 • Default Gateway: 192.168.202.1
Left & Right Motor Settings	<ul style="list-style-type: none"> • Senergy ECO • Normal Braking • Maximum Rated Speed • CW Direction • 30 mm Acceleration • 30 mm Deceleration
Module Mode	<ul style="list-style-type: none"> • PLC I/O Controlled
Look Ahead & Timing Setting	<ul style="list-style-type: none"> • JAM Timer = 5.00 • Auto Clear Timer = 5.00 • Run After Timer = 0.00 • Sensor Debounce = 0.10 • All Induct Timers = 0.00
Control Ports	<ul style="list-style-type: none"> • All Options Unchecked
Sensors	<ul style="list-style-type: none"> • Sensors are “ON is Blocked”
Connections	<ul style="list-style-type: none"> • All are cleared



EASYROLL SOFTWARE CONFIGURATION TOOL

INTRODUCTION

The *EasyRoll* Software Configuration Tool is a PC based application that provides the means to configure a *ConveyLinx* controlled conveyor system. *EasyRoll* also provides the ability to change *ConveyLinx* module default parameters.

Installing EasyRoll and performing the initial Auto Configuration is described in the previous section

BASIC FEATURES

Some of the basic module parameters that can be modified by *EasyRoll* are:

- ZPA Mode Selection (singulation, train, etc.)
- MDR type (ECO or BOOST or BOOST-8)
- MDR rotation direction
- MDR speed, acceleration and deceleration values
- Jam and Run After clear time values
- *Look Ahead* slow down and *Lane Full Interface* settings
- *Blink & Wink* function used to visually locate a *Module* on the conveyor

EasyRoll provides the ability change these parameters for a single module or a group of modules all at once. *EasyRoll* can display the status information for any *ConveyLinx* module on the network's subnet.

ADVANCED FEATURES

Some of the advanced features available with *EasyRoll* are:

- Firmware Upgrade utility for one or a group of *Modules*.
- *Network Services Discover* utility used to find all *Modules* on a network and manually set their I.P. addresses.
- Module *Connection* mapping to logically link two or more separate *ConveyLinx* networks.
- *Extensions* to allow a *Module* to suspend its ZPA function and be logically connected to an adjacent *Module* for motor run command.
- *PLC* mode selection allows a *Module* to suspend its ZPA function and be logically controlled from an external PLC.
- The ability to Back-Up and Restore the Network Configuration.
- The ability to restore a backup by IP or by Nodes. Restoring by IP's is useful when you need to duplicate part or all a system.

OPTIONS FOR CONFIGURING YOUR PC'S IP ADDRESS

Note that your PC's I.P. address does not have to be in the same subnet as your Modules in order to perform the Auto Configuration procedure with EasyRoll as described in the previous section. However, your PC's I.P. address and/or subnet mask has to be properly set in order to read and change Module's parameters and settings.

Once a *ConveyLinx* network or *Subnet* has been configured by the *Auto-Configuration Procedure* with the *Subnet* value taken from the factory "out of the box" IP address of the *Auto Configuration Master* (similar to example shown above); you will need to do **one** of the **three** following procedure in order to have your PC be able to connect to the *Subnet* and use *EasyRoll* software:

Option	Description
Method 1	Allow <i>ConveyLinx's</i> built-in <i>DHCP</i> service automatically assign an I.P. address to your PC
Method 2	Manually change the I.P. address and/or subnet mask of your PC to match the <i>ConveyLinx Subnet</i>
Method 3	Manually change the I.P. address of the <i>Auto-Configuration Master</i> to a new <i>Subnet</i> that is accessible from the I.P. address already configured in your PC

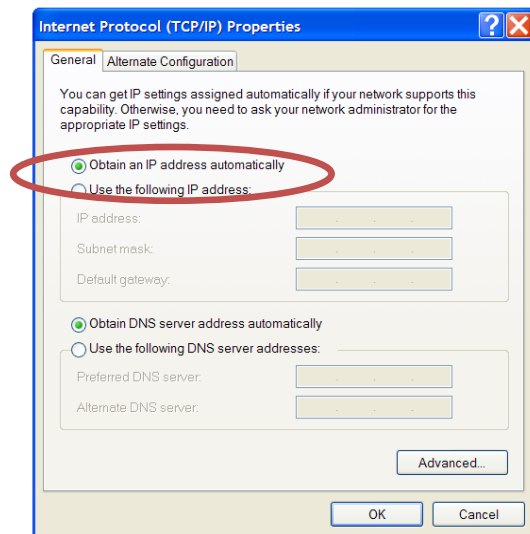
Any of these choices is equally valid and totally dependent on user preference.

METHOD 1 - USING DHCP SERVICE FOR PC I.P. ADDRESS

For installations where you are connecting to a single simple *Subnet* and your PC is already configured to have its I.P. address assigned; it is recommended to allow the *ConveyLinx* network automatically assign an I.P. address to your PC utilizing *ConveyLinx's* built-in *DHCP* service. This is the easiest method particularly if your PC is already set-up to have its I.P. addressed assigned.

If using the *ConveyLinx DHCP* service to assign your PC's I.P. address; you do not need to even start *EasyRoll* to accomplish this.

If your PC is already configured to obtain an IP address automatically; then by simply connecting you PC as shown in *Figure 24 - Initial PC Connection to ConveyLinx Subnet* is all you have to do to have the PC's I.P. address configured so you can use *EasyRoll*



MANUAL I.P. ADDRESS CONFIGURATION METHODS

Manual configuration of your PC's I.P. address may be your preference for larger system configurations with multiple *Subnets* and/or installations where you want to keep a dedicated PC connected all the time.

For installations where there are multiple *ConveyLinx Subnets* that share the same physical Ethernet cabling (either directly or through Ethernet switches); it is recommended that the *Subnets* be pre-determined and that each *Auto-Configuration Master* have its *Subnet* set in advance of performing each of their respective Auto Configuration Procedures. By pre-determining all *Subnets* required; your PC can have its I.P. address and subnet mask set to appropriate values so that you can access all your *ConveyLinx Subnets* from a single PC with *EasyRoll*.

Regardless of which manual procedure you choose, with your PC and *EasyRoll* you can easily accomplish either.

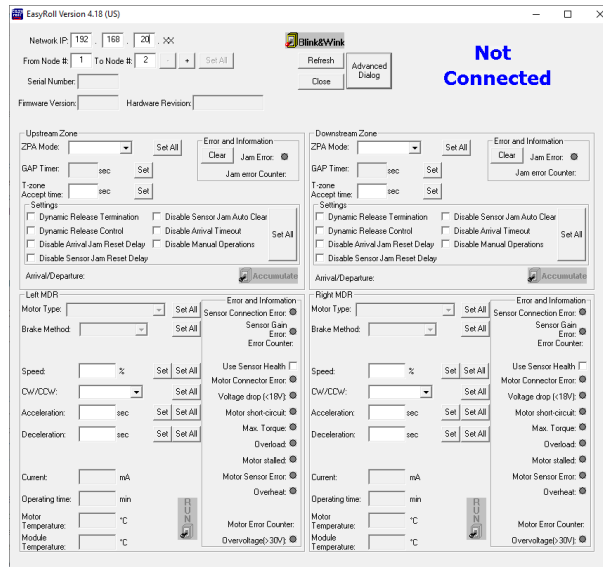
USING EASYROLL TO LOCATE AUTO-CONFIGURATION MASTER

For either manual method of I.P. address configuration, you must access the I.P. address information of the *Auto-Configuration Master Module* on your network by using *EasyRoll*.

STARTING EASYROLL APPLICATION

If you followed the default installation setting when you installed *EasyRoll*; the program should be selected from "Start – All Programs – Industrial Software – EasyRoll". If you selected a different location when you installed; go to that location and run "EasyRoll.exe".

When you first run *EasyRoll*; you should see a window like this with greyed out status values and blank parameter boxes



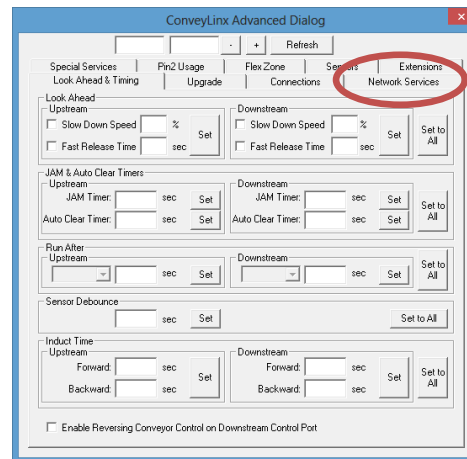
Regardless of whether you need to change your PC's I.P. address to match your already configured *ConveyLinX Subnet* or change the *ConveyLinX Subnet's Auto-Configuration Master* to match a subnet address you want to use; you must connect to the *Auto-Configuration Master*.

USING THE NETWORK SERVICES UTILITY

One of the features of *EasyRoll* is that it has a utility called *Network Services Discover* that allows your PC to go and find any *Modules* that may be physically connected to you network regardless of the I.P. address settings of your PC or the I.P. address settings of the *Modules*.

To access the UDP Discover Utility; you need to invoke the *ConveyLinX Advanced Dialog* window. To do this, click the *Advanced Dialog* button on the main screen or press **F2** on your keyboard to invoke the Advanced Dialog.

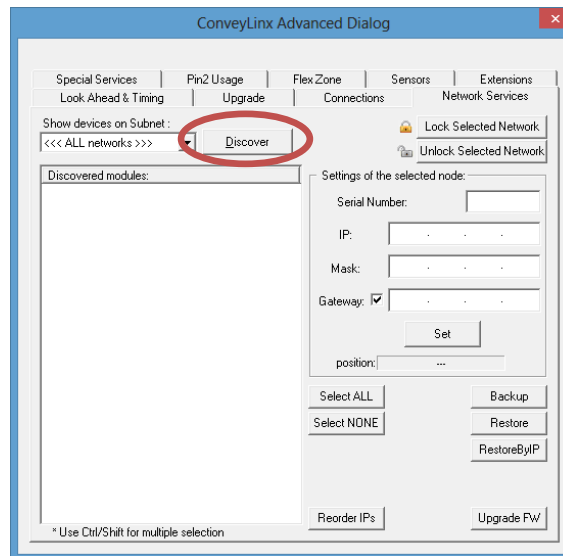
After clicking the *Advanced Dialog* button or pressing **F2**, *EasyRoll* will display the *ConveyLinX Advanced Dialog* screen. Click on the tab *Network Services*.





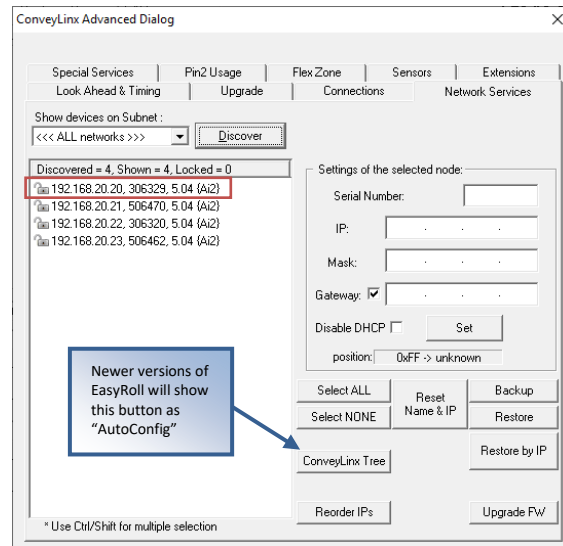
After clicking the *Network Services* tab, you will see the screen you will use to both “discover” the *Modules* that can be found as well as select a specific *Module* in which to modify its I.P. address settings.

On this screen, click the *Discover* button



After clicking the *Discover* button, *EasyRoll* will query the network and return a list of all *Modules* it finds and shows each module’s I.P. address, serial number and current Firmware. We already know that the *Auto-Configuration Master* is the *Module* with the *Node* of 20.

In this example, 4 *Modules* were found, and the *Auto-Configuration Master* is at 192.168.20.20, its serial number is 306329 and has Firmware 5.04



Please refer to section *ConveyLinX Advanced Dialog* on page 71 for further descriptions for the remaining *ConveyLinX Advanced Dialog* screen selection tabs.

METHOD 2 - CHANGE PC TO MATCH AUTO-CONFIG MASTER

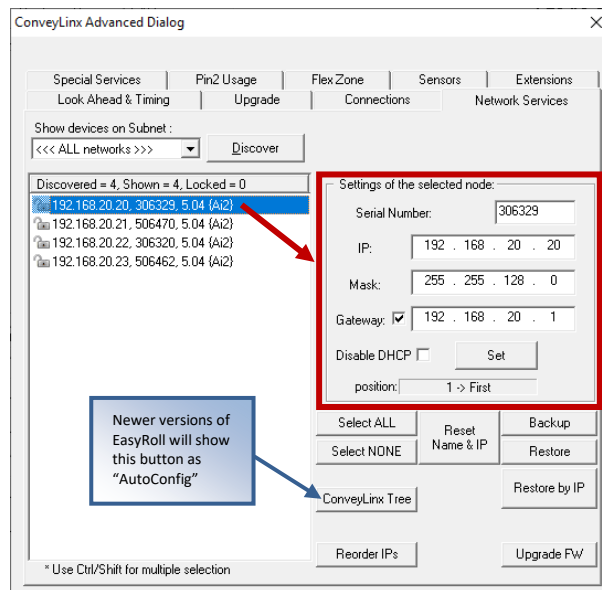
At this point, because you now know the *Auto-Configuration Master*’s I.P. address you can simply change your PC’s IP address configuration so that it can have access to the *Auto-Configuration Master*’s Subnet. In the example above, the *Auto-Configuration Master*’s I.P. address is 192.168.26.20 therefore the *ConveyLinX Subnet* is

192.168.26. Please refer to *Appendix C—Configuring PC for Ethernet Subnets* for details on how to set your PC's IP address and subnet mask to access the *ConveyLinX Subnet* you discovered.

METHOD 3 - CHANGE AUTO-CONFIG MASTER I.P. ADDRESS

In cases where you want to set the *Auto-Configuration Master's* I.P. address to something other than the default it used when the *Auto Configuration Procedure* was performed, you can do this from the same *Network Services* screen.

Double click the *Auto-Configuration Master* in the list. When you do this, its I.P. address information is filled in as shown. Simply enter in the new I.P. address information you want to use and then click the *Set* button.



After clicking the *Set* button, you can click the *Discover* button again and *EasyRoll* will refresh the list of modules at the left. You can verify that the module has the new I.P. address settings.



At this point, this ConveyLinX Subnet will no longer operate because its *Auto Configuration Master's* I.P. address has been changed. You must perform the *Auto Configuration Procedure* again so that all downstream *Modules* will have their I.P. address updated to match the *Auto Configuration Master's* new Subnet.

EASYROLL MAIN SCREEN

Assuming you have either changed your PC's configuration or changed the *Auto Configuration Master's* configuration as described above; you should now be able to use the *EasyRoll* main screen to view your system's status and change operational parameters. If you have followed the above example, simply closing the *ConveyLinx* Advanced Dialog will show the main screen. The main screen is also shown when you first run *EasyRoll*. *Figure 36* shows a typical main screen.

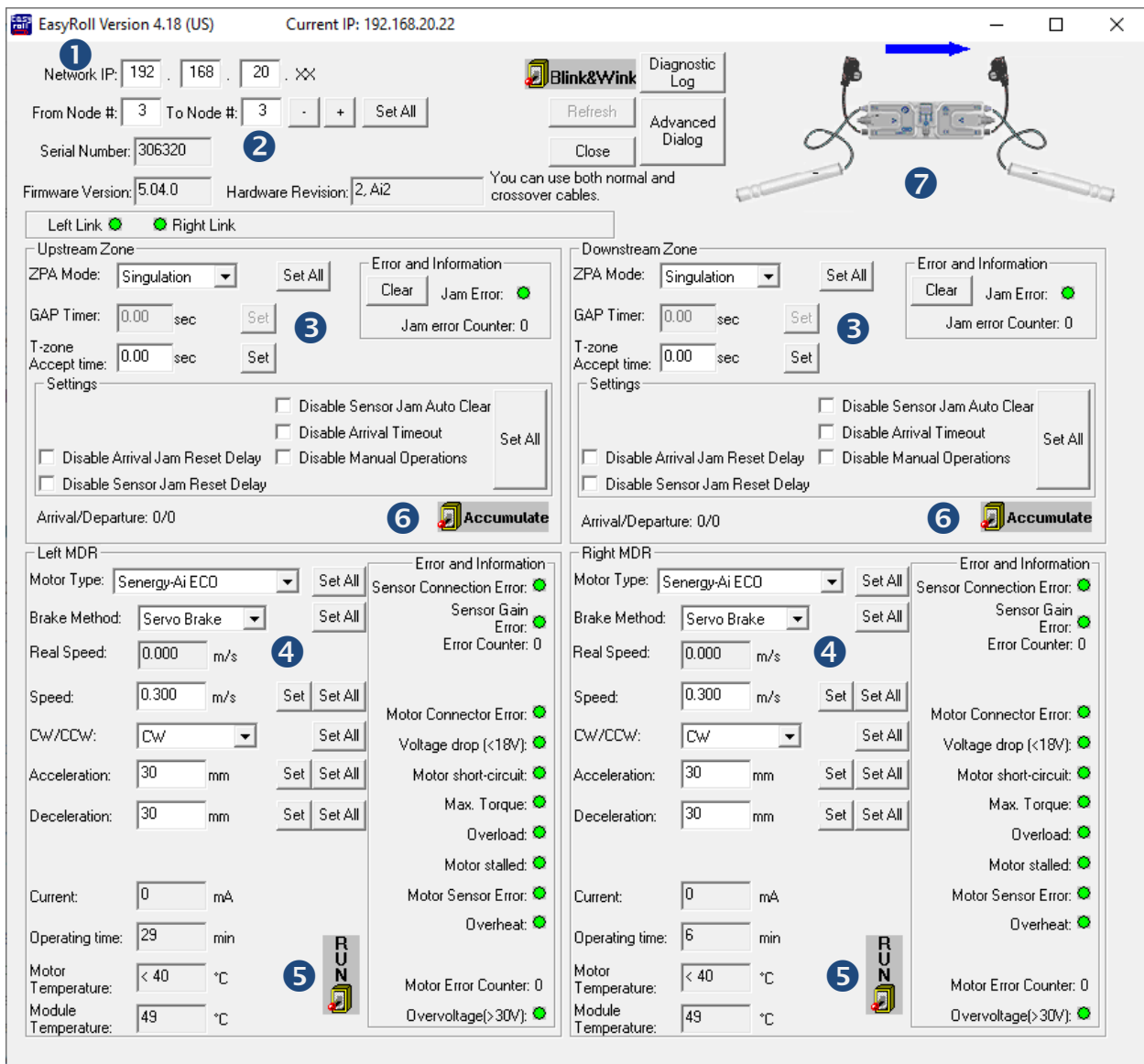


FIGURE 36 - EASYROLL MAIN SCREEN

The numbered items in *Figure 36* show the basic functional areas and detailed descriptions will follow for each.

Item	Description
1	Network IP – This is where you enter the <i>Subnet</i> of the ConveyLinx network you wish to connect
2	Node No. – This is where you enter a range of <i>Nodes</i> in which to connect. Entering values here will cause the <i>Refresh</i> button to enable. Clicking this button will cause the rest of the items (3, 4, and 5) to be populated.
3	Upstream Zone / Downstream Zone – These selections allow you to change the ZPA mode of the zone and command the zone to Accumulate if a carton arrives.
4	Left Zone / Right Zone Settings – These are the selections for changing MDR type, braking method, speed, direction, and accel/decel time values. There are also <i>Set</i> and <i>Set All</i> buttons used to write values to module(s)
5	Force Run – On/Off Toggle controls used to jog the local zone's motor
6	Force Accumulate – On/Off toggle controls used to set the local zone to accumulation mode
7	Configuration Indicator – This area will display a graphic image of the current module's detected configuration

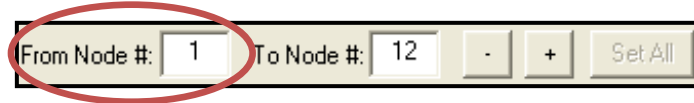
Please note that some of the detailed information shown in this figure may be different for your system and that most of these fields will be blank until you initiate communications.

CONNECTING TO CONVEYLINX

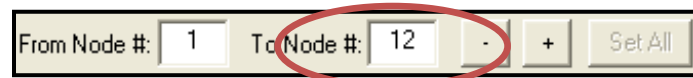
Once the Network IP boxes (1) have been entered with the correct *Subnet*, you then type in a range of *Nodes* (2) you wish to connect; the *Refresh* button will become enabled. Click the *Refresh* button and data for the rest of the main screen should fill in.

NODE NAVIGATION

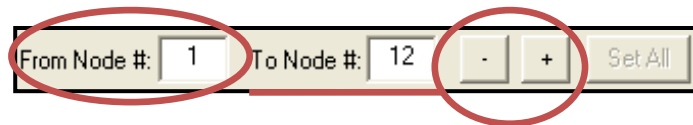
Whatever *Node* is entered in the first box will be the Module data shown in the remainder of the main screen.



The *Node* value entered in the second box does not have to be the actual “last” node of the network. If you enter a *Node* value higher than exists; you can still click the *Refresh* button and you will not receive an error message. For the example shown; if there were only 10 *Nodes* installed and you entered 12, would not receive an error message after clicking the *Refresh* button.



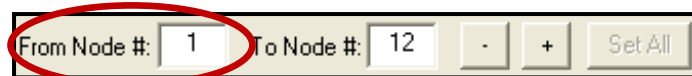
Clicking the “+” and “-” buttons will increment / decrement the *Node* value in the first box and display the *Module* data for the new *Node* selected. Please note that if you increment past the value of the last physical *Node* installed, you will receive an error message.



NODE IDENTIFICATION

EasyRoll main screen has a feature identified as “Blink & Wink” that allows you to visually verify the *Node* you have selected.

If a valid *Node* is selected in the first text box in the *Node No.* area and its information is displayed on the main screen; clicking the *Blink&Wink* switch icon will signal the selected *Module* to blink on and off all its LED indicators. Click the *Blink&Wink* switch icon again to turn this off.

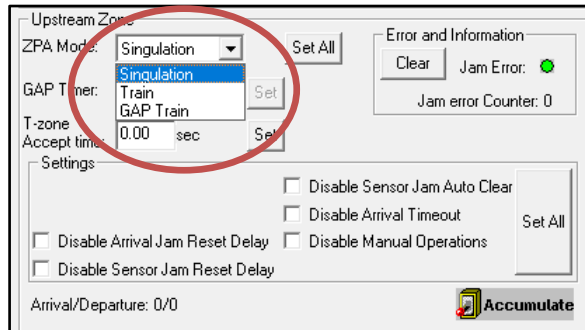


When Wink&Blink is enabled, module is placed into a stopped state until you turn it off. Be sure to turn Wink&Blink OFF to return module to its configured operation

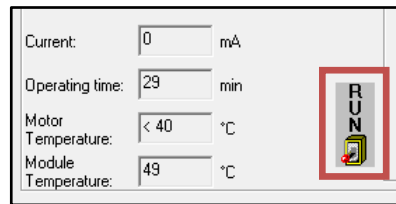
UPSTREAM / DOWNSTREAM ZONE CONFIGURATION

Once you have selected the Node you wish to view and/or modify, you can go to the settings.

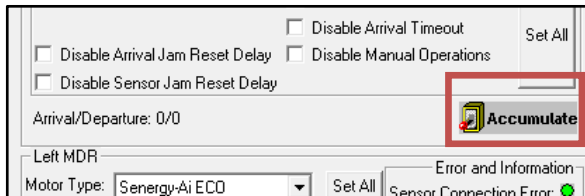
Selecting the pull-down box for *ZPA Mode* will show the available selections. *Singulation* is the default configuration. Please refer to section *ZPA Mode Selections* on page 59 for descriptions for *Train* and *GAP Train* modes.



Clicking the *Run* switch icon will cause the zone's MDR to jog in its default rotation direction.

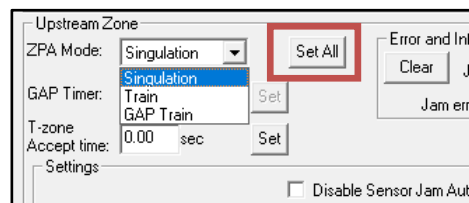


Clicking the *Accumulate* switch icon will place the zone in accumulation mode and the next carton that arrives at that zone will stop and remain until you click the switch again to turn off the accumulation mode.



Selecting a new setting from the *ZPA Mode* drop down box immediately changes the zone's mode. If you want to set all Upstream zones for the range of nodes entered in the *Node No.* text boxes, then click the *Set All* buttons.

Similarly, you can do the same operation in the *Downstream Zone* portion of the main screen.



ZPA MODE SELECTIONS

Singulation mode is the default configuration for all zones upon the completion of the *Auto Configuration Procedure*. Please refer to section *Default Singulation Release ZPA Mode* on page 42 for description. The following sections describe the ZPA modes available via *EasyRoll*.

TRAIN RELEASE MODE

For zones configured for *Train Release Mode*; when the downstream train zone releases, all subsequent upstream zones begin to run simultaneously. This makes the MDR conveyor operate like a conventional single drive roller conveyor in that all cartons move at once. *Figure 37* illustrates a typical *Train Release* example.

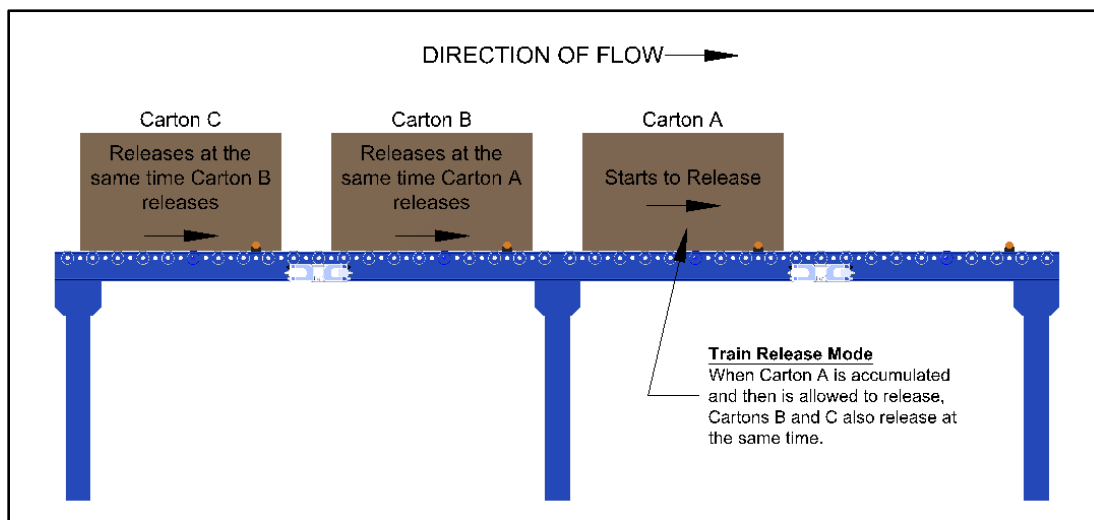


FIGURE 37 - TRAIN RELEASE EXAMPLE



Please note that singulation and train modes are configurable per zone and can be mixed on the same network.

GAP TRAIN RELEASE MODE

Gap Train is a variant to *Train* release in that it incorporates a fixed time delay prior to allowing the cartons to move. The typical usage of *Gap Train* would be to apply this configuration to the discharge zone of a group of zones already placed in *Train* mode. This configuration would be used to assure a specific minimum gap between cartons when they release from an accumulated state. This functionality is often used instead of strict *Train Release* in order to stagger the starting of multiple motors to even out power supply loading. *Figure 38* depicts an example of *GAP Train Release*.

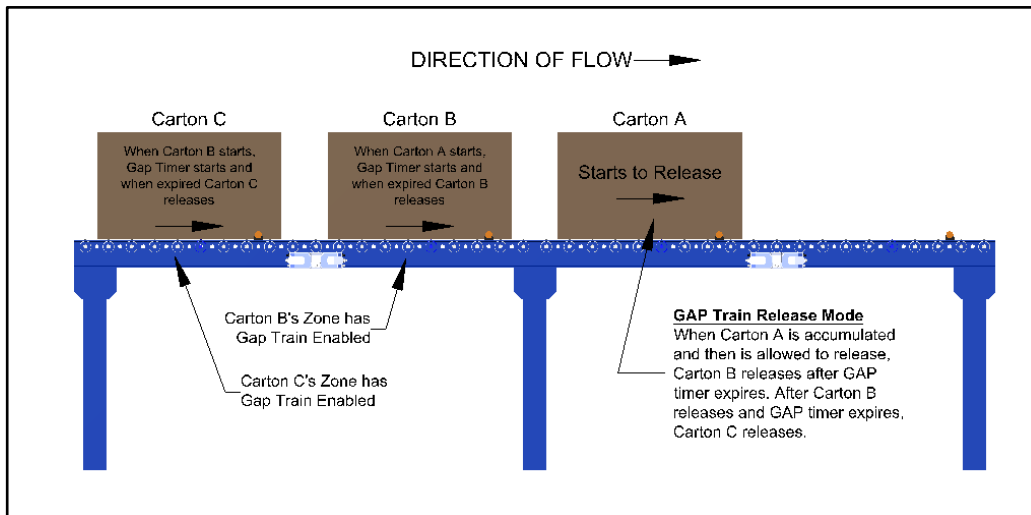


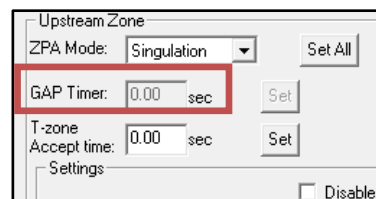
FIGURE 38 - GAP TRAIN RELEASE EXAMPLE



Please note GAP Timer is only used when a carton releases from an accumulated state. GAP Timer is NOT used when cartons are flowing without needing to stop to accumulate.

For example, let's say we have applied *Gap Train Mode* to 10 consecutive zones and then set the *GAP Timer* to 1 second on each of the 10 zones. Starting with all 10 cartons stopped and accumulated, when we release the most downstream carton of the group of 10, the zone immediately upstream of this discharging carton starts its *GAP Timer* and after 1 second, this carton will release. When this carton releases the carton immediately upstream of it will start its own *GAP Timer* and after 1 second, this carton will release. This same operation will repeat for each of the remaining cartons in succession. Please note that each zone can have a different *GAP Timer* setting.

When you select *Gap Train* from the *ZPA Mode* drop-down box; the *Gap Timer* data entry box and *Set* button are enabled. Simply enter the desired time value and click the *Set* button to update the value in the selected *Node*



***Gap Train* mode is designed to be used at the discharge zone of a group of zones configured for *Train* mode. If more than one consecutive zone is configured as *Gap Train*; then each of these zones will in turn require that their respective gap timers expire. Depending on the time value used, the result may appear to be *Singulation* mode.**

T-ZONE CONFIGURATION

In conveyor applications, transferring a carton at a right angle from one conveyor to another often requires special lifting and lowering mechanisms. In certain applications, one conveyor can simply drive its carton off its downstream zone directly onto the upstream zone of another conveyor that is perpendicularly oriented. This type configuration is commonly defined as a *T-Zone* arrangement. *ConveyLinx* contains the logic to control a *T-Zone* arrangement without requiring any external control interface or programming. *Figure 39* shows the kind of *T-Zone* arrangement that is available within *ConveyLinx* without any external control interface.

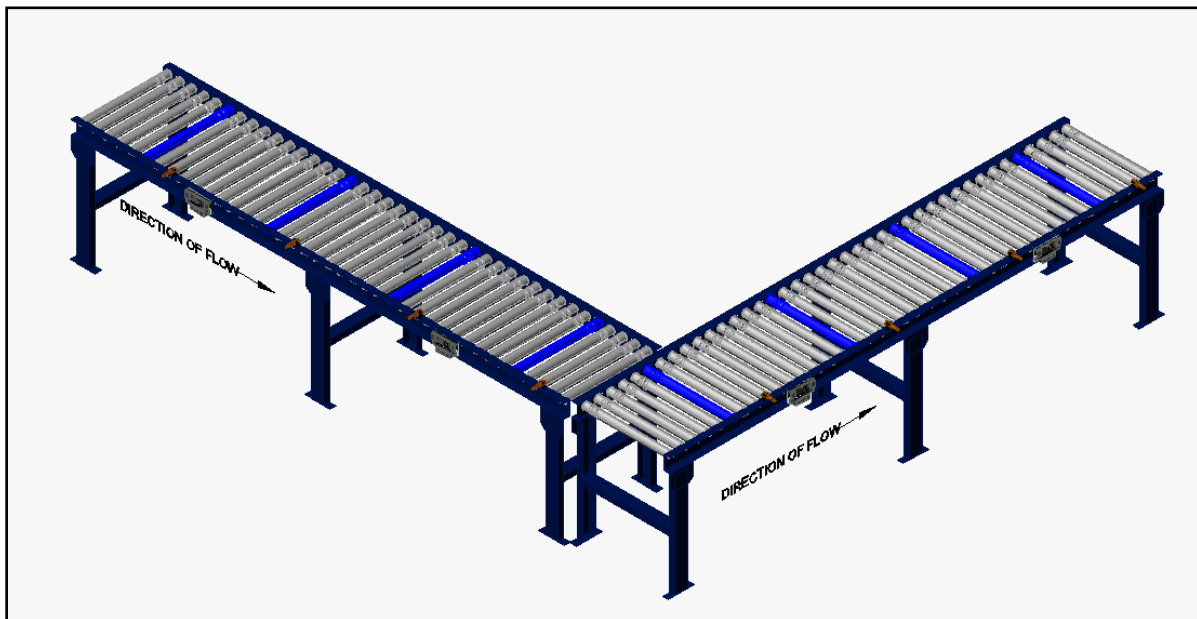


FIGURE 39 - TYPICAL T-ZONE CONFIGURATION



Material handling considerations such as discharge conveyor speed and carton weight must be analyzed prior to implementing a *T-Zone* configuration. Be sure to verify your mechanical design and carton characteristics before utilizing a *T-Zone* arrangement.

CONNECTING MODULES FOR T-ZONE ARRANGEMENT

A *T-Zone* arrangement can be made operational in one of two ways:

1. Sending and Accepting zones can be on the same *Module*
2. Sending and Accepting zones can be on two different *modules* if they have established their upstream/downstream connections by the *Auto Configuration Procedure*

Figure 40 and *Figure 41* depict two ways to connect the MDR's and photo-sensors to *Modules* to result in a valid *T-Zone* configuration.

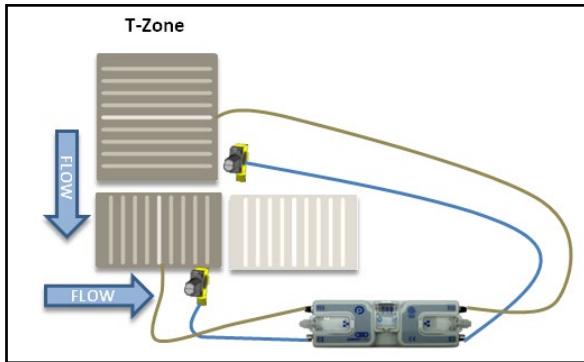


FIGURE 40 - SINGLE MODULE T-ZONE EXAMPLE

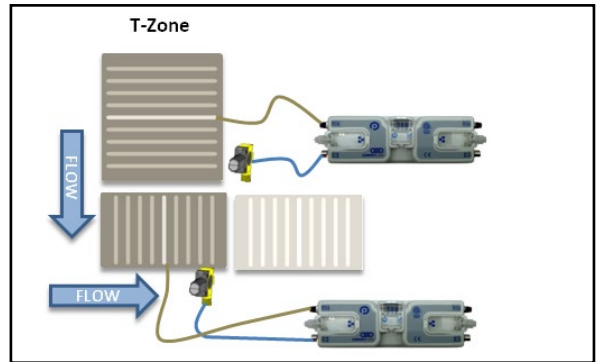
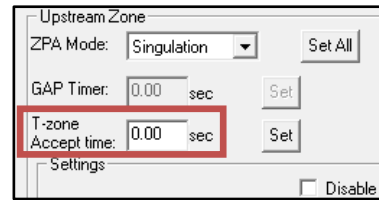


FIGURE 41 - TWO MODULE T-ZONE EXAMPLE

To configure a T-Zone arrangement to operate properly, the “T-zone Accept Time” on the main screen must be set to a non-zero value. This time value is the duration that the accepting zone’s rollers will delay in running so the upstream sending zone can convey the carton onto stopped rollers in the accepting zone. Once this time value has expired, the accepting zone’s rollers will be enabled to run based upon normal downstream conditions. A value of 200 milliseconds is typical for nominal MDR system speeds.

Enter the value, for example 0.200 for 200 milliseconds and click the *Set* button. Whether to change the *Upstream Zone* or *Downstream Zone* value on the main screen is dependent upon which zone is the *accepting* zone. The *T-zone Accept time* is always applied to the *accepting* zone.

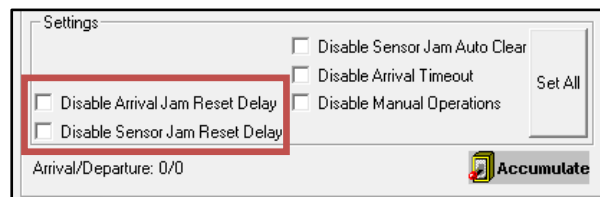


SETTINGS CHECK BOXES

DISABLE RESET DELAYS

Any individual zone or group of zones can be configured to ignore the *Auto Clear Time* delay for either or both of the *Arrival Jam* (see section *Arrival Jam* on page 44) and *Sensor Jam* (see section *Sensor Jam* on page 44). Selecting either of these options will not eliminate the detection of the jam condition; it simply eliminates the default *Auto Clear Time* delay the logic utilizes before automatically clearing the condition.

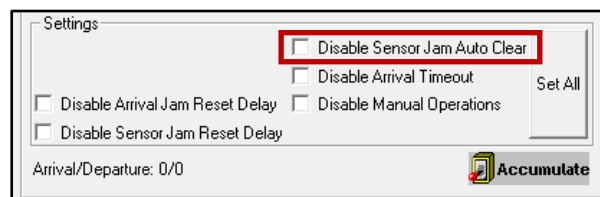
Clicking either or both checkboxes will cause the zone's logic to ignore the *Auto Clear Time* delay for the jam condition



DISABLE SENSOR JAM AUTO CLEAR

Section *Sensor Jam Auto Clear Procedure* on page 44 describes how the logic will make 3 attempts to clear a *Sensor Jam* if one occurs. There may be instances at specific zones or range of zones where you do not want this functionality to happen. There is a check box that allows you to disable this functionality.

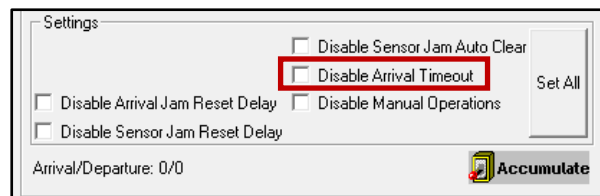
Clicking the *Disable Sensor Jam Auto Clear* check box will disable the 3 attempts to clear the *Sensor Jam* and will cause the zone to remain in the jam state until the sensor is cleared manually.



DISABLE ARRIVAL TIMEOUT

Section *Arrival Jam* on page 44 describes how default zone to zone logic utilizes the *Jam Time* value for the discharging zone to wait for the accepting zone to indicate successful arrival of the *carton* into the accepting zone. In certain applications for a given zone, you may want to disable this functionality.

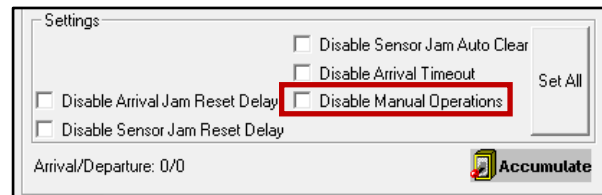
Clicking the *Disable Arrival Timeout* check box will prevent the discharging zone from registering an *Arrival Jam* condition. Upstream *cartons* will not wait to enter the discharging zone once a *carton* has left the discharging zone.



DISABLE MANUAL OPERATION

In normal ZPA operation, if a zone is in Accumulation (either by external device or *Local Zone Accumulation* control by Pin 3 on the *Control Port*) and the *carton* is subsequently manually removed from the conveyor; the zone downstream of the accumulated zone will run in an attempt to “find the lost *carton*”. In certain applications or situations where manually removing *cartons* from accumulated zones is expected; you can disable the running of the downstream zone to “find the lost *carton*”.

You first navigate the main screen to the zone you want to prevent from running when it's upstream neighboring zone has its *carton* removed. Clicking the *Disable Manual Operations* check box will prevent this zone from running when its upstream neighbor has an accumulated *carton* manually removed.

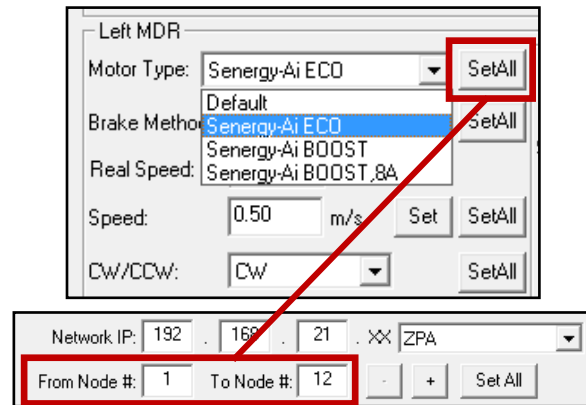


MDR SETTINGS

The two largest areas of the main screen are for *Left MDR* and *Right Zone* and these areas display MDR settings and overall status as well as the ability to change motor settings.

MOTOR TYPE

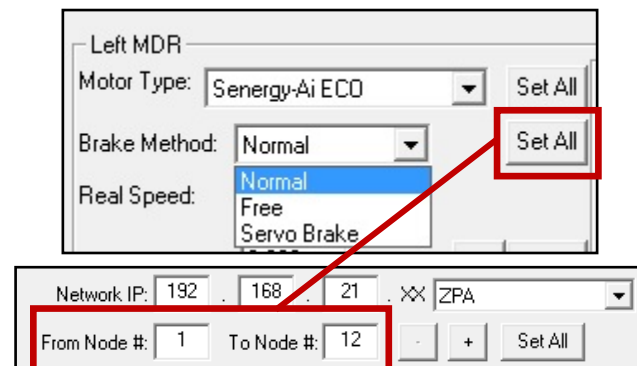
The *Motor Type* pull-down box lists all motor brand and types whose profiles are available for the *module*. *Senergy ECO* is the default setting upon completion of the *Auto-Configuration Procedure*. The new settings are downloaded to the selected Node upon selecting a new item from the list. Clicking *Set All* will download the selected setting to the Left MDR of all *modules* entered in the range of *Nodes* at the top of the main screen in the *From Node # / To Node #* boxes. If for example these boxes had the values of 1 and 12; changing the selection in the *Motor Type* pull down will change *Node 1* and clicking *Set All* will change *Nodes 2* thru 12 to the same setting as Node 1



Please consult your MDR's documentation and review your application if you are unsure as to which motor-type setting to use. Please also refer to Appendix E – Power Supply Loading on page 121 for additional information.

BRAKE METHOD

The *Brake Method* pull-down box lists all the MDR braking methods available for the *module*. *Normal* is the default setting upon completion of the *Auto-Configuration Procedure*. The new settings are downloaded to the selected Node upon selecting a new item from the list. Clicking *Set All* will download the selected setting to the Left MDR of all *modules* entered in the range of *Nodes* at the top of the main screen in the *From Node # / To Node #* boxes. If for example these boxes had the values of 1 and 12; changing the selection in the *Motor Type* pull down will change *Node 1* and clicking *Set All* will change *Nodes 2* thru 12 to the same setting as Node 1.



The following table defines the MDR Braking Methods available:

Method	Description
Normal	Standard Dynamic braking - MDR power circuit in the <i>Module</i> is internally connected during motor stop sequence to provide backward energy to bring rotor to a stop. When a <i>Module</i> has detected that the motor has stopped; all winding current is shut off from the MDR. This is the MDR industry standard braking method and is the default factory setting for all <i>Module</i> zones from the <i>Auto-Configuration Procedure</i>
Free	MDR power circuit in the <i>Module</i> is internally disconnected to allow rotor to “free spin” until its mechanical load brings it to a stop.
Servo Brake	When a zone is commanded to stop; the <i>Module</i> utilizes the MDR’s Hall Effect sensors to determine the position of the rotor and will inject current into the motor windings to maintain rotor position.



Please note that for Servo Brake mode, the motor circuitry supplies power to the motor to keep it in position. The more torque required to hold the motor rotor position will result in more current being supplied. Prolonged braking at higher torque values can result in motor over current and/or over heating conditions.

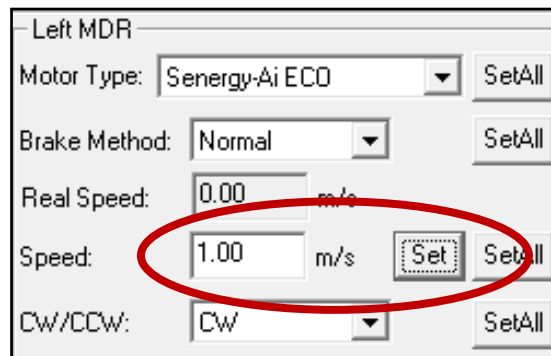
SPEED

The *Speed* setting value is in meters per second (m/s). The Senergy-Ai2 motor roller contains data as to its gear reduction ratio and roller diameter that is readable by the *Module*. *EasyRoll* then uses this information to indicate whether the speed you enter is valid for the connected roller.

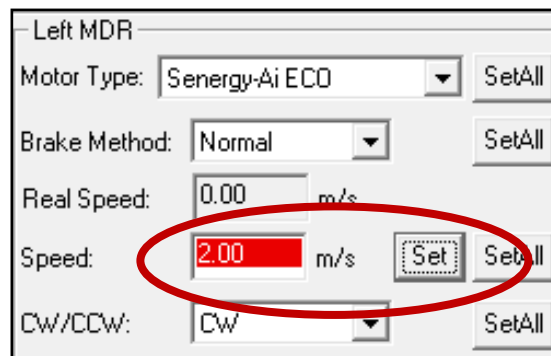
Motor Roller gear reduction can be determined from the motor roller part number which can be shown by mouse-over in the Module Diagnostic Window. Please visit pulseroller.com for more information on determining the rated speed and valid speed range for a given part number

For example, the motor roller information displayed in *Figure 43* indicates that the rated speed of the motor roller we have connected to our module is 60 meters/minute, or 1 meter/second.

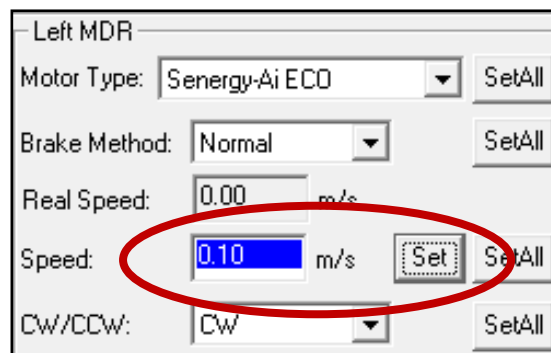
Entering a value of "1" for the speed and clicking *Set* will set the speed for the roller. If the background of the speed entry box remains white, then the speed is valid for the roller part number detected by the module.



For our example roller, entering a speed of 2 m/s is over its allowable maximum speed. The background of the speed entry box will change to red indicating the speed setting is too high



For our example roller, entering a speed of 0.1 m/s is under its allowable minimum speed. The background of the speed entry box will change to blue indicating the speed setting is too low



MOTOR DIRECTION

This setting is either **Clock-Wise (CW)** or **Counter-Clock Wise** and is determined for each *Module* based upon the *Auto-Configuration Procedure* results. Please refer to section *Motor Direction Definition* on page 28 for definition of rotation direction.

This setting is available because some mechanical designs or situations may cause the MDR to be mounted such that the MDR cable exits the opposite side of the conveyor from the *Module*.

Please note that Motor Direction does not have a *Set All* button because motor direction is determined during the *Auto-Configuration Procedure*.

ACCELERATION / DECELERATION

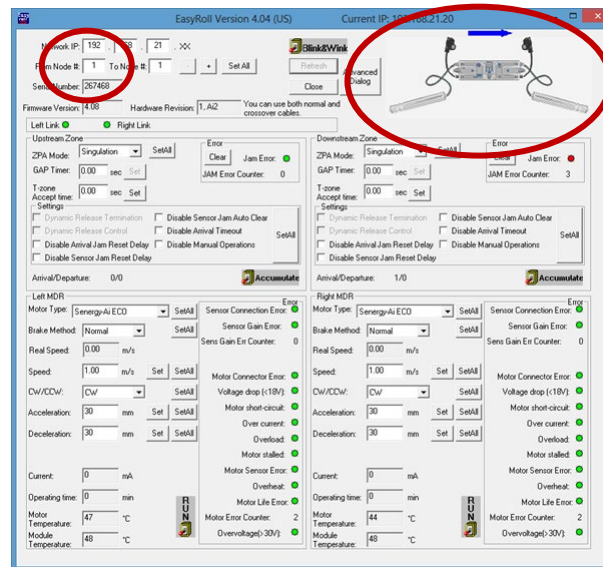
The acceleration and deceleration control for a given MDR is configurable in value of distance rotated. The default acceleration value is 30 mm and the default deceleration value is 30 mm.

The range of allowed values for acceleration are from 0.03 meters (30mm) to 10 meters. The range of allowed values for deceleration are 0 to 10 meters.

DIAGNOSTICS WINDOW

By clicking the image of the *Module* in the upper right of the main screen will open the *Diagnostics* window.

Click the image in the upper right to open the *Diagnostics* window and display the current status of the selected node



When opened, the *Diagnostics* window displays the current status of the selected connected module. This window shows the current status of the module as well as the zone status of this module's immediate upstream and downstream connections. You can also see the state of any connected sensors and motors. An example is shown in *Figure 42*.

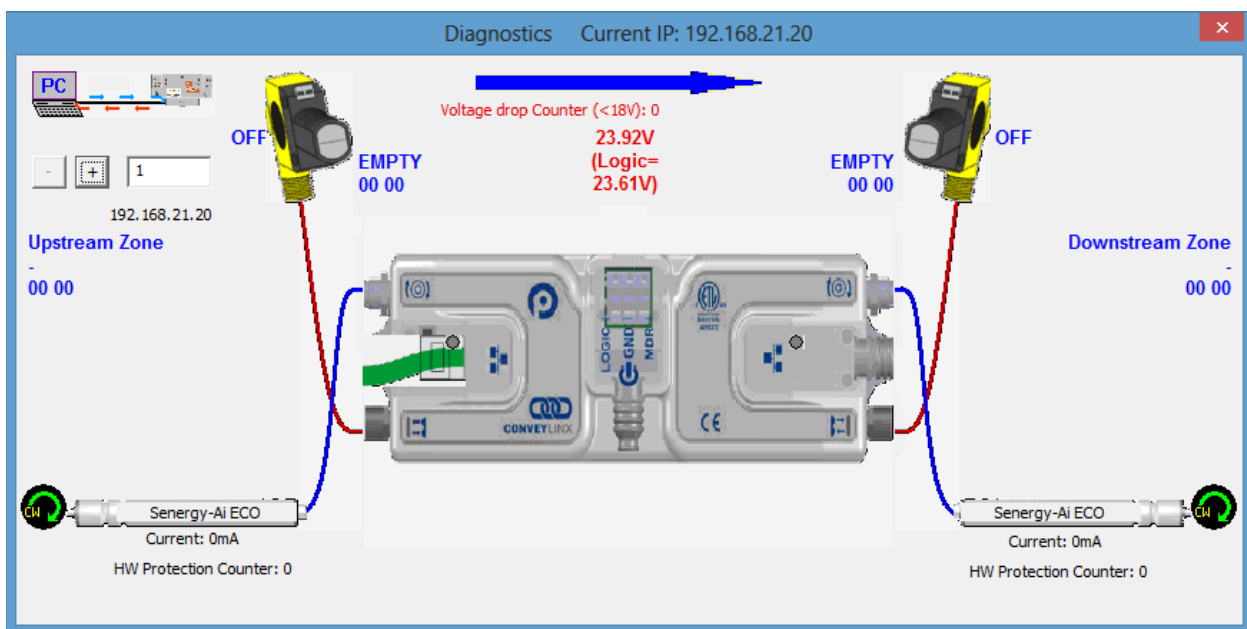


FIGURE 42 - DIAGNOSTICS WINDOW EXAMPLE

One very useful feature of the *Diagnostics* window is that you can mouse-over the image of each roller and a pop-up will display the pertinent motor parameters as well as the part number and serial number of the connected roller as shown in *Figure 43*.

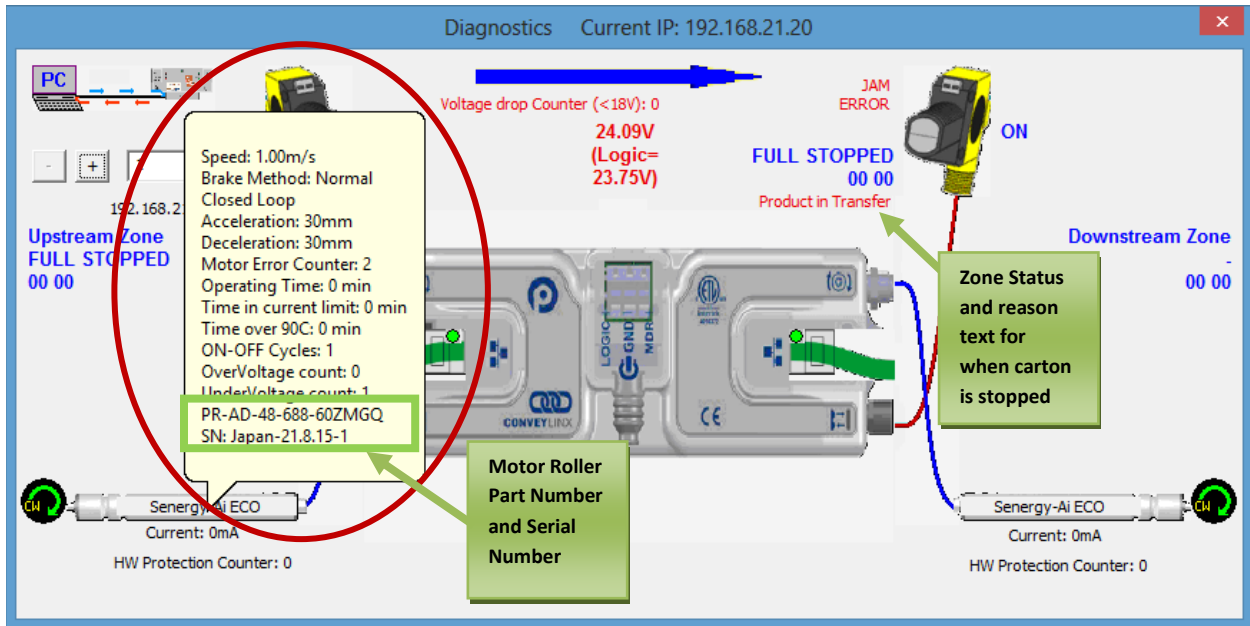


FIGURE 43 - MODULE DIAGNOSTIC SHOWING MOTOR ROLLER DATA

A powerful feature of the ConveyLinx-Ai2 module is that it retains the part number, serial number, and usage data for the last 32 motors that have been connected. This data is also preserved if a module is replaced as described in section Automatic Module Replacement on page 45.

CONVEYLINX ADVANCED DIALOG

We introduced the *ConveyLinx Advanced Dialog* briefly in section *Using the Network Services Utility* on page 52. This section will define the remaining tab selections from this screen.

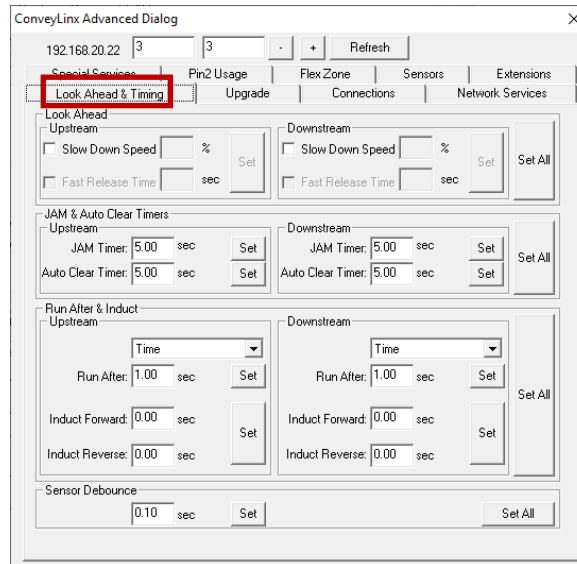
INVOKING THE CONVEYLINX ADVANCED DIALOG

To invoke the *ConveyLinx Advanced Dialog* you can do any of the following:

- Click *Advanced Dialog* button
- Press F2
- Simultaneously press [Ctrl] [Shift] U



The *ConveyLinx Advanced Dialog* pops up over the Main screen display and defaults to show the *Look Ahead & Timing* tab



LOOK AHEAD & TIMING TAB

The *Look Ahead & Timing Tab* has 4 sections of settings:

- *Look Ahead*
- *Jam & Auto Clear Timers*
- *Run After & Induct*
- *Sensor Debounce*

LOOK AHEAD FEATURE

The *Look Ahead* feature configures the *Module* logic to “look ahead” to its next downstream zone and if it is occupied when a carton is entering its zone, the *Module* will dynamically adjust the MDR to the selected speed. This feature would be used in higher speed applications where increased stopping distance is required to keep cartons from over-travelling their stop positions. This function can be applied per zone or for multiple zones.

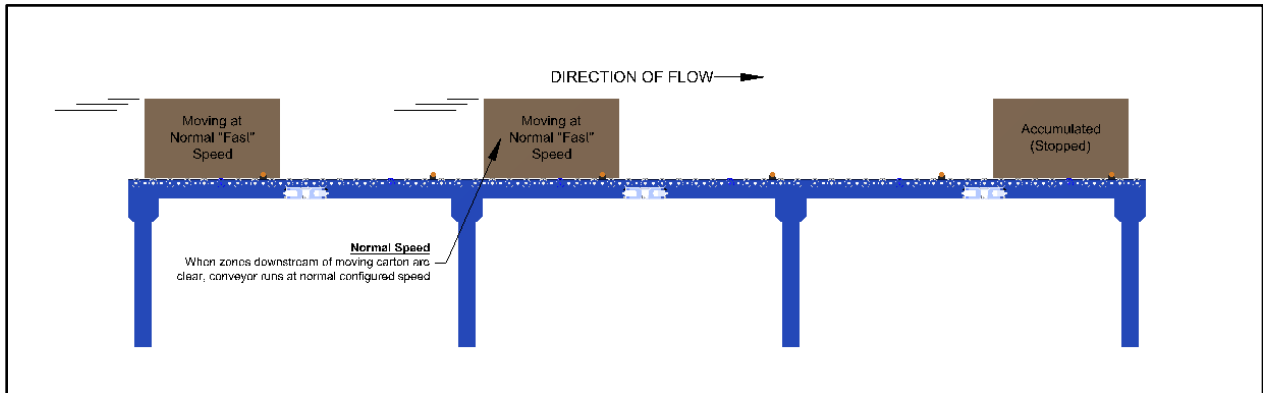


FIGURE 44 - NORMAL RUNNING BEFORE LOOK AHEAD ENABLES

In *Figure 44*, conveyor runs at the speed configured for the *Module* per the *Auto-Configuration Procedure* or the value entered if it was manually changed.

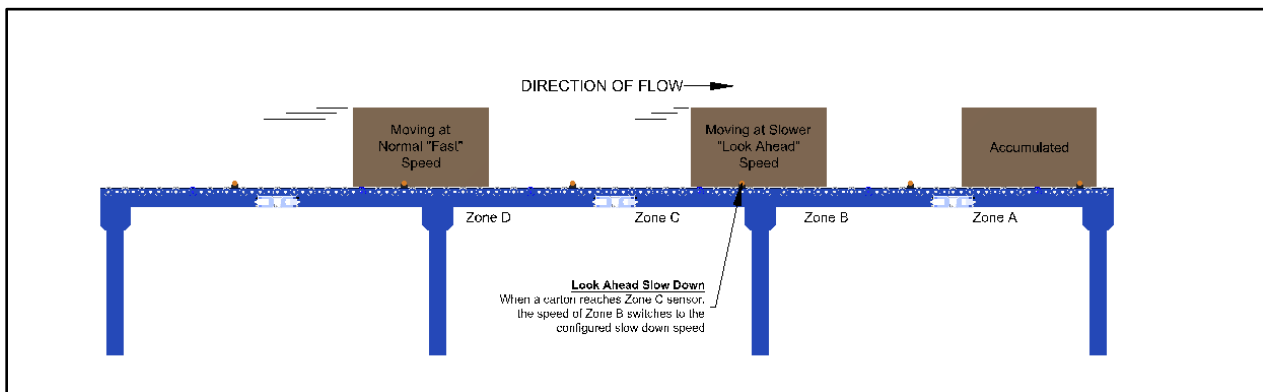
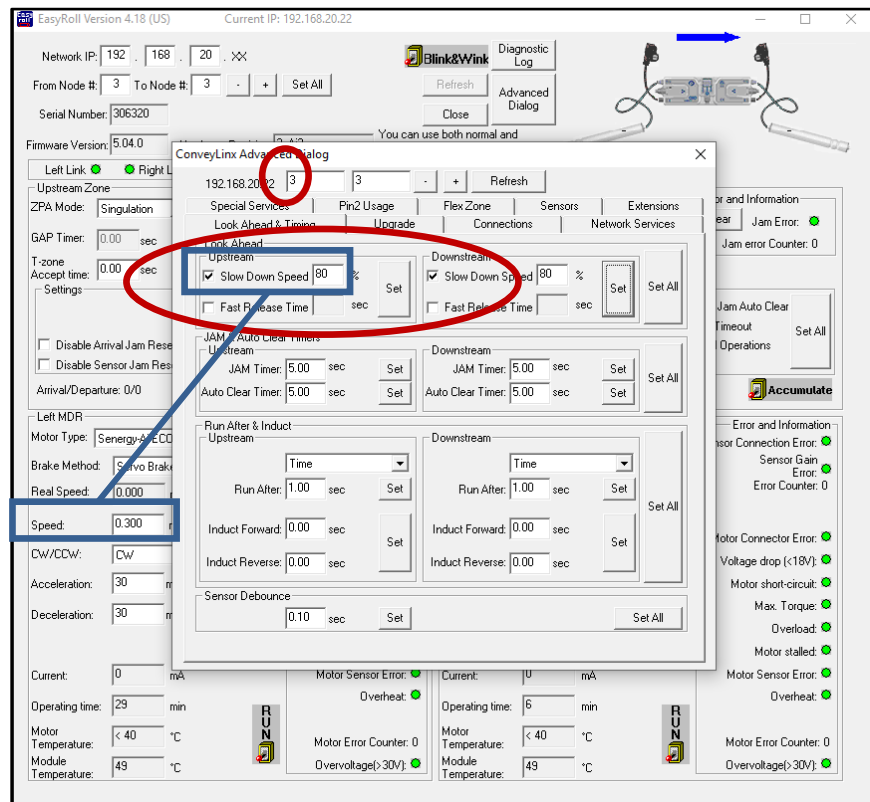


FIGURE 45 - LOOK AHEAD ENABLED

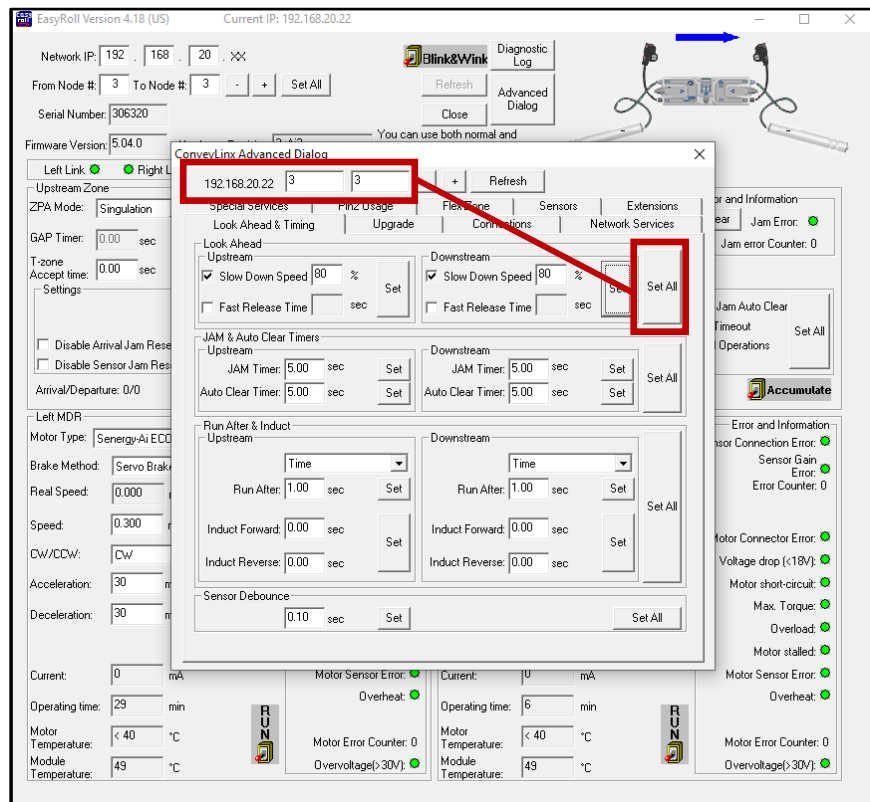
As shown in *Figure 45*, when a carton arrives at Zone C’s photo-sensor, Zone B’s *Module* will automatically adjust the speed of Zone B to the configured *Look Ahead* speed.



Click the checkbox to enable the *Look Ahead* feature for the selected *Node*. Clicking the *Set* buttons will download the setting to the respective zone on the selected *Node*. The value entered for the slowdown speed is in percent of the *Node's* speed as set on the main screen. In this example, the slowdown speed will be proportional to 80% of 0.3 m/s.



Clicking *Set All* will enable the *Look Ahead* feature at the % speed entered for all *Nodes* in the range of *Nodes* entered at the top of the *Advanced Dialog*



FAST RELEASE TIME OPTION

The *Fast Release Time* option allows you to set a delay before the slow down speed is engaged for the slow-down zone. This option may be useful for singulation release applications when the zone that was initially accumulated is in the process of releasing downstream, but it has not completed the move. In this situation, the slow down zone would already be set to run at the slow down speed because the initially accumulated zone is technically still occupied in the ZPA logic. This situation is shown in *Figure 46*.

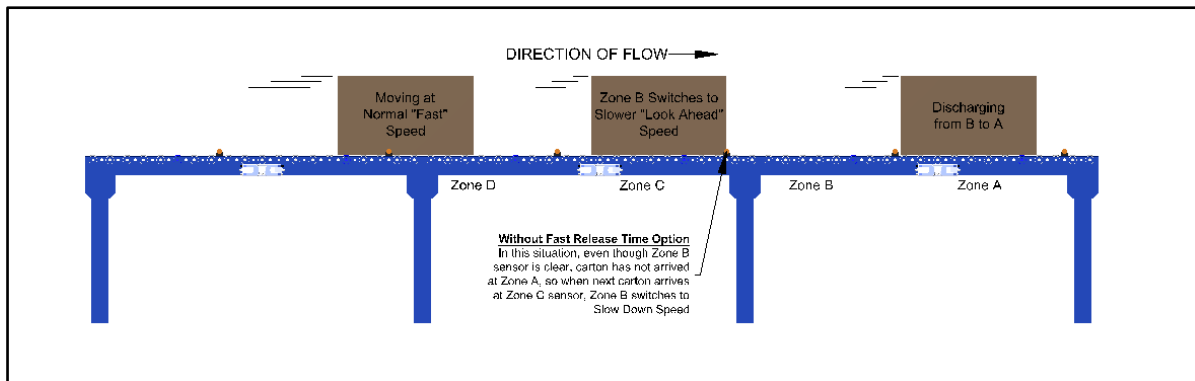


FIGURE 46 - EXAMPLE WITHOUT FAST RELEASE TIME OPTION

The *Fast Release Time* causes the slow down zone to wait until this time expires before actually switching to the slow down speed. In the scenario described, the *Fast Release Timer* is engaged when the upstream *carton* begins to enter the slow down zone. While this timer is engaged, the slow down zone will remain at normal speed. If the initially accumulated zone's status changes to unoccupied before the *Fast Release Time* has expired; the slow down zone will not switch to the slow down speed and remain at normal speed. This is shown in *Figure 47*.

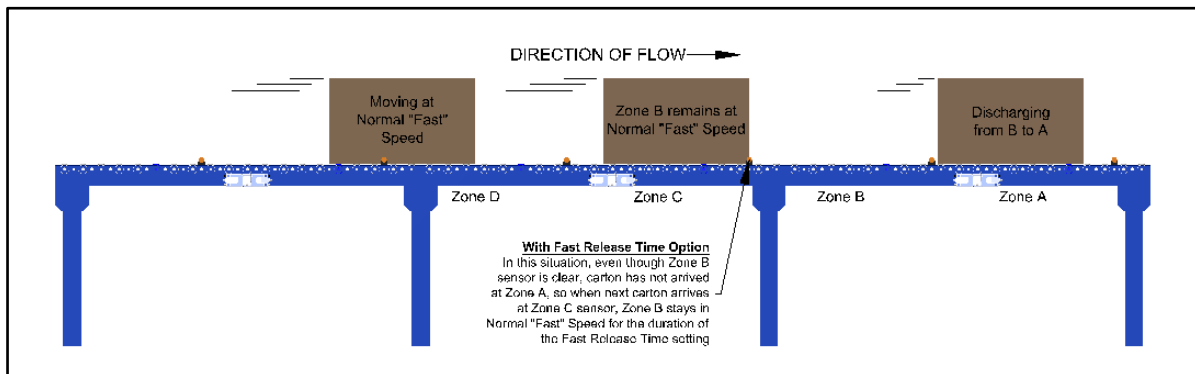
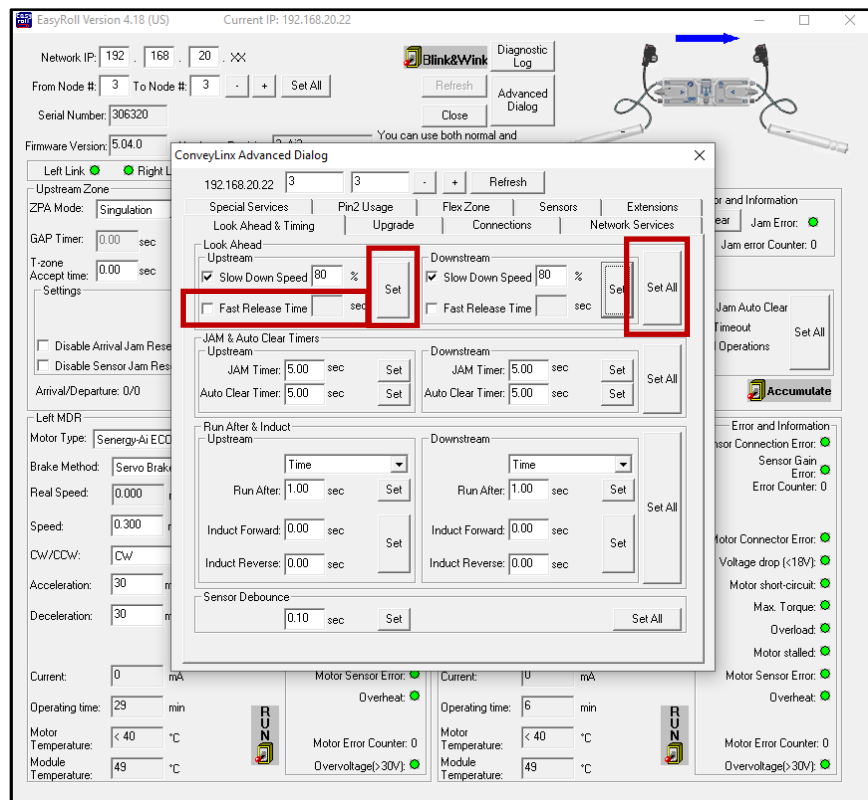


FIGURE 47 - EXAMPE WITH USING THE FAST RELEASE TIME OPTION

To use the Fast Response Time option, click the *Fast Release Time* checkbox and enter a time value (in seconds) into the value entry box. Click *Set* to write the changes to the module and use the *Set All* feature as desired.

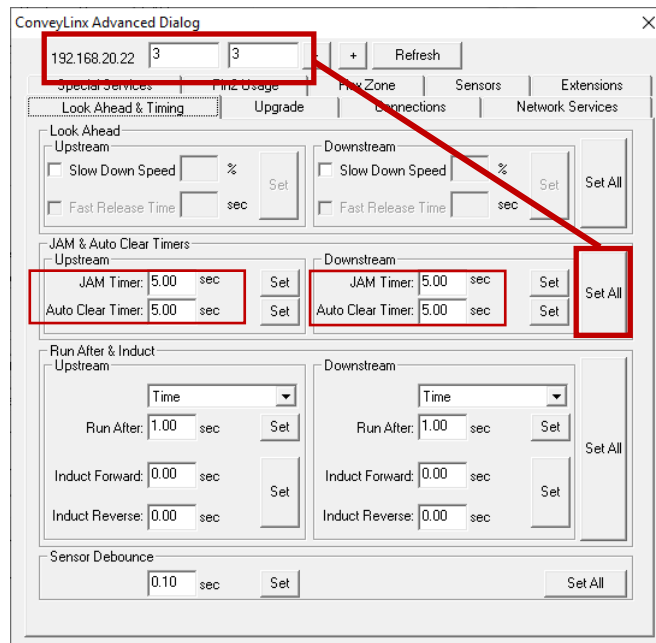


JAM & AUTO CLEAR TIMERS

The *Jam* timer for a given Upstream or Downstream zone is used for both detecting an *Arrival Jam* and a *Sensor Jam*. Please refer to sections *Arrival Jam* on page 44 and *Sensor Jam* on page 44 for description and details. The *Jam Timer* should be set as the maximum expected time it takes for a *carton* to travel from one zone to the next plus a small addition to prevent nuisance jam occurrences. The default value for the *Jam Timer* is 5 seconds and the valid range of values is from 1 seconds to 65 seconds.

The *Auto Clear Timer* is the amount of times that the logic maintains the jam condition before auto resetting the jam. The default value for the *Auto Clear Timer* is 5 seconds and the valid range of values is from 0 seconds to 65 seconds.

Enter new values for either or both the *Jam Timer* and/or *Auto Clear Timer* and click the corresponding *Set* button for each. The *Set All* button will apply these same settings for the range of modules indicated at the top of the dialog.

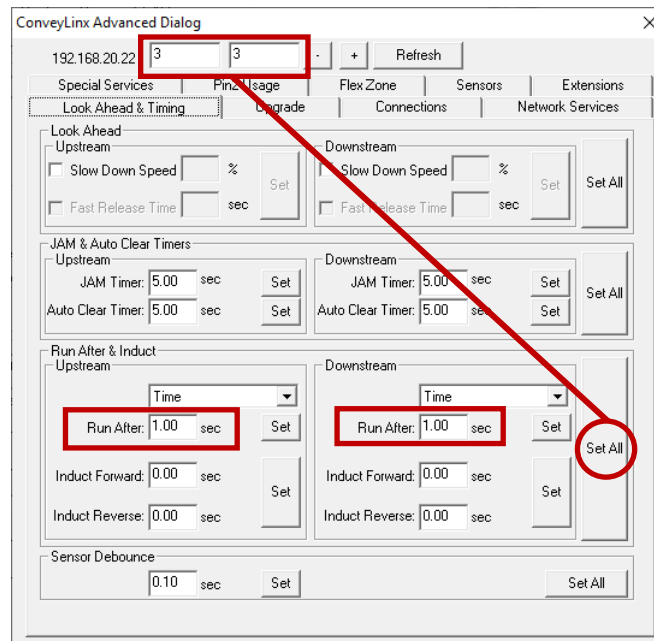


RUN AFTER & INDUCT

RUN AFTER TIME

The *Run After* time value is used by the logic for normal zone discharge. This is the amount of time the zone’s MDR will continue run after its photo-sensor has been clear when discharging to the next downstream zone. This extra run time allows the zone to run so that the trailing edge of the carton to completely pass the photo-sensor and fully enter the next zone. This value is adjustable to compensate for special conditions where a zone photo-sensor is required to be placed farther upstream or downstream.

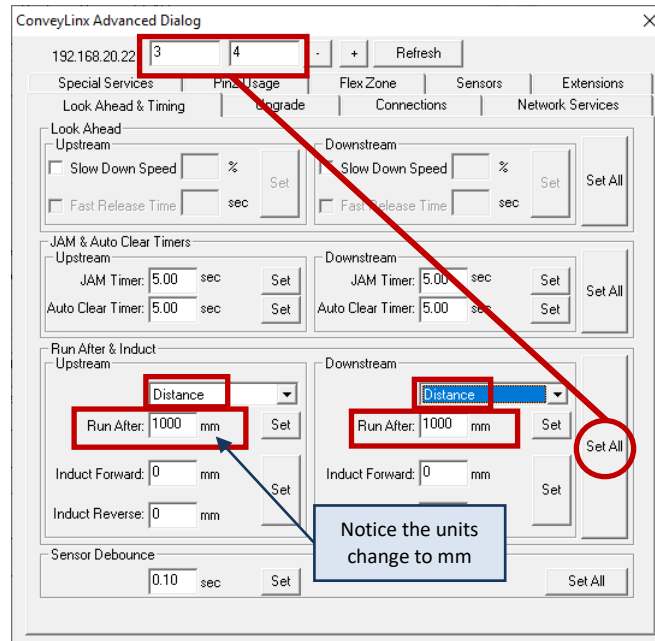
Enter new values for upstream and/or downstream *Run After* time and click the corresponding Set button. The default is 5 seconds and the valid range is 0 to 65 seconds. The *Set All* button will apply these same settings for the range of modules indicated at the top of the dialog.



RUN AFTER DISTANCE

EasyRoll provides the option to change the *Run After* metric to be distance based instead of time based. When the metric is distance, the value entered is in mm instead of seconds.

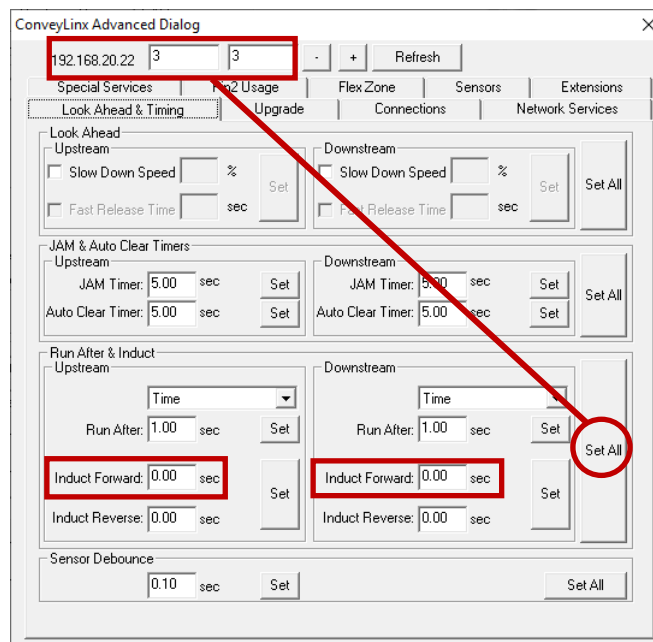
Select *Distance* from the drop-down box and enter new values for upstream and/or downstream *Run After* pulses and click the corresponding Set button. The default is 1000 mm and the valid range is 0 to 65,535. The *Set All* button will apply these same settings for the range of modules indicated at the top of the dialog.



INDUCT FORWARD TIME

Induct Forward value is used to cause the MDR to continue to run after the zone's photo-sensor has been blocked when receiving a *carton* from upstream. This value is adjustable per zone to compensate for special conditions when for example a zone's photo-sensor needs to be placed farther upstream from the discharge end of the zone.

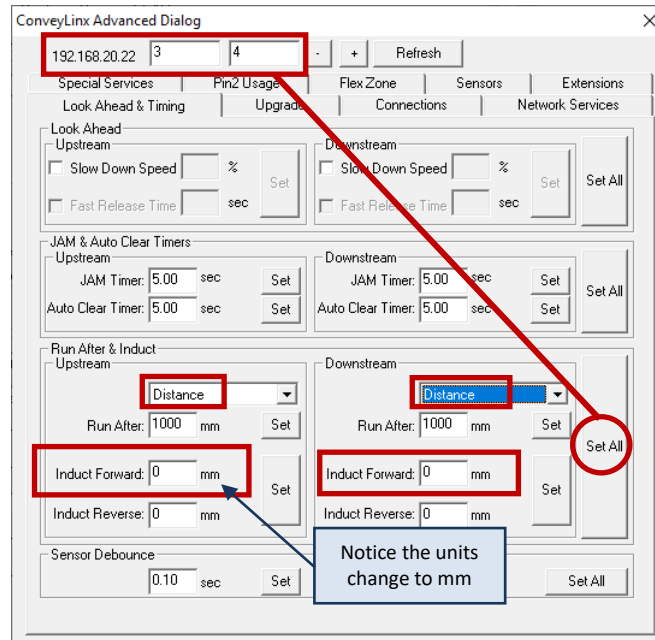
Enter new values for upstream and/or downstream *Run After* time and click the corresponding Set button. The default is 5 seconds and the valid range is 0 to 65 seconds. The *Set All* button will apply these same settings for the range of modules indicated at the top of the dialog.



INDUCT FORWARD DISTANCE

EasyRoll provides the option to change the *Induct Forward* metric to be distance based instead of time based. When the metric is distance, the value entered is mm instead of seconds.

Select *Distance* from the drop-down box and enter new values for upstream and/or downstream *Induct Forward* pulses and click the corresponding *Set* button. The default is 0 pulses and the valid range is 0 to 65,535. The *Set All* button will apply these same settings for the range of modules indicated at the top of the dialog.



INDUCT REVERSE

ConveyLinX allows for reversing conveyor operation within its built-in ZPA control logic. A prerequisite for using reversing conveyor is that the *cartons* handled should be roughly the same length in the direction of travel. Based upon this pre-requisite, the zone sensor should be located roughly in the center of the zone. You will want to roughly center the *carton* in the zone if it needs to accumulate, so you would use the *Induct Forward* setting to accomplish this for the default or forward direction. EasyRoll provides an *Induct Reverse* setting to provide this setting for the reverse direction if the adjustment needs to be different based upon conveyor direction. Also note that the time or distance selection applies to the *Induct Reverse* setting.

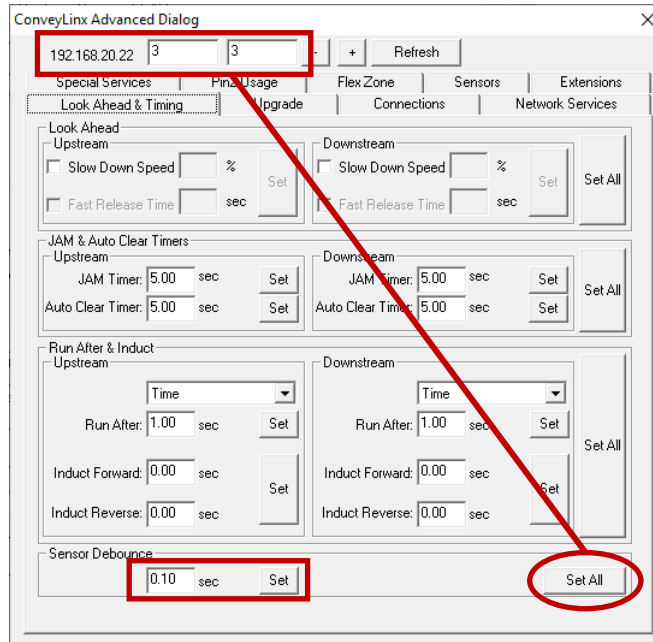
Even though reversing conveyor logic is built-in to the module's ZPA controls; it requires an external PLC or PC-based controller to activate it and send it commands for forward or reverse operation. Please refer to ConveyLinX-Ai2 PLC Developer's Guide (publication ERSC-1506)

SENSOR DEBOUNCE

Sensor Debounce setting is the time the logic holds the state of its Sensor inputs after a change of state. **Keep in mind this is not a delay prior to the logic detecting a *carton* when it first blocks the sensor.** The *module* will

detect the leading edge of a *carton* and hold this state for the *Sensor Debounce* time period. Similarly, when the trailing edge of the *carton* clears the sensor, the logic holds this state for the *Sensor Debounce* time period.

Enter the desired value in seconds and click the Set button. The default is 0.1 seconds and the valid range is 0 to 2 seconds. Please note this setting applies to both the Left and Right Sensor ports. The *Set All* button will apply these same settings for the range of modules indicated at the top of the dialog

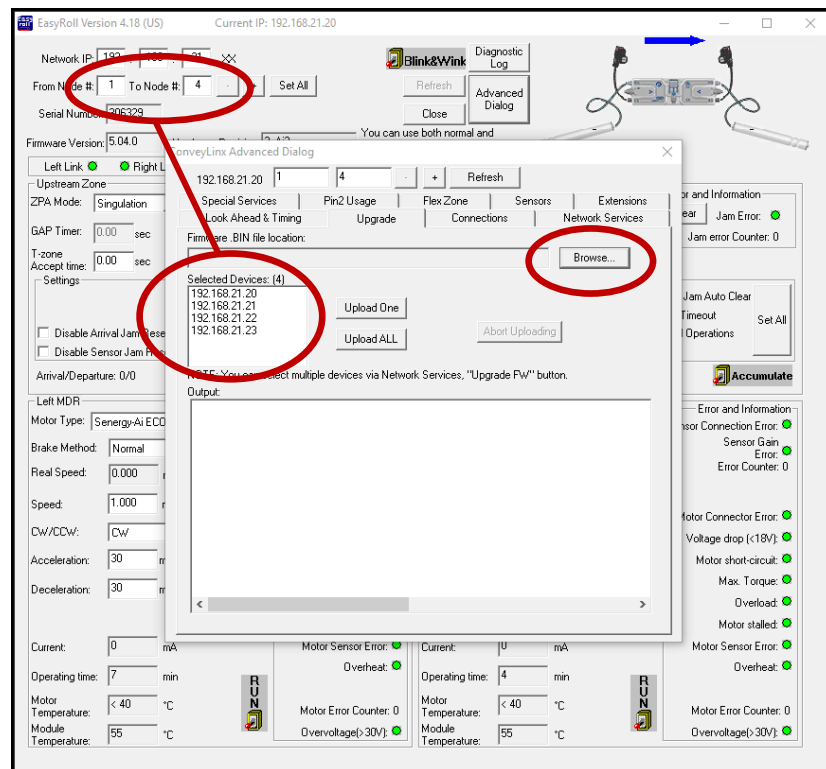


UPGRADE TAB

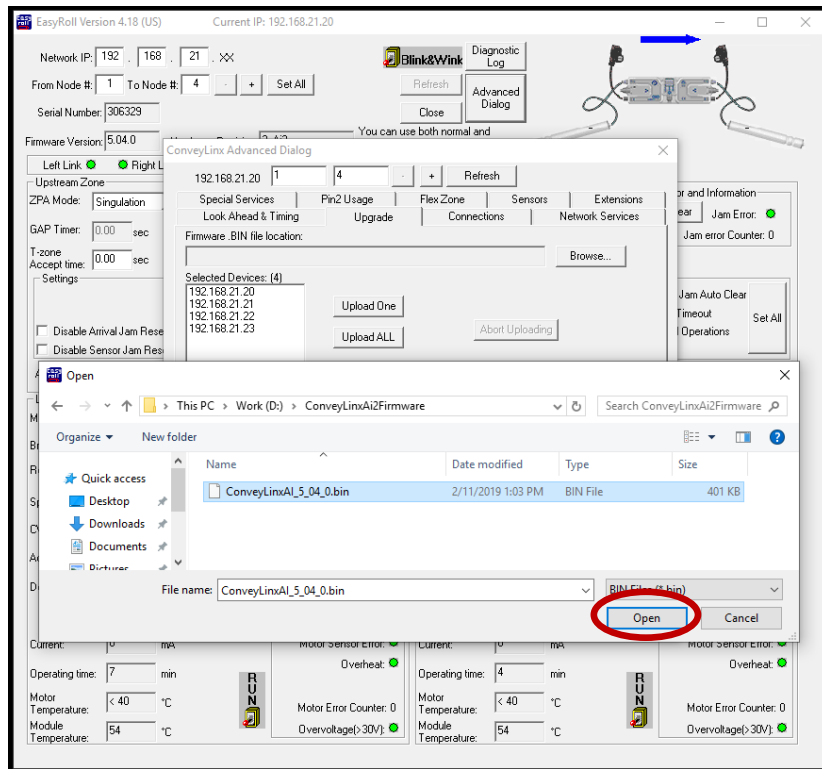
The *Upgrade* tab screen gives access to the *ConveyLinx* firmware utility. Over time, enhancements and features may be added to the *ConveyLinx* family of products. These features and enhancements are typically made available to customers in the form of firmware upgrade files that need to be uploaded to your *Modules*.

A firmware upgrade will be in the form of a data file sent to you or made available for download. The *Upgrade* utility allows you to browse for this data file and then select a single *Node* or group of *Nodes* to upload.

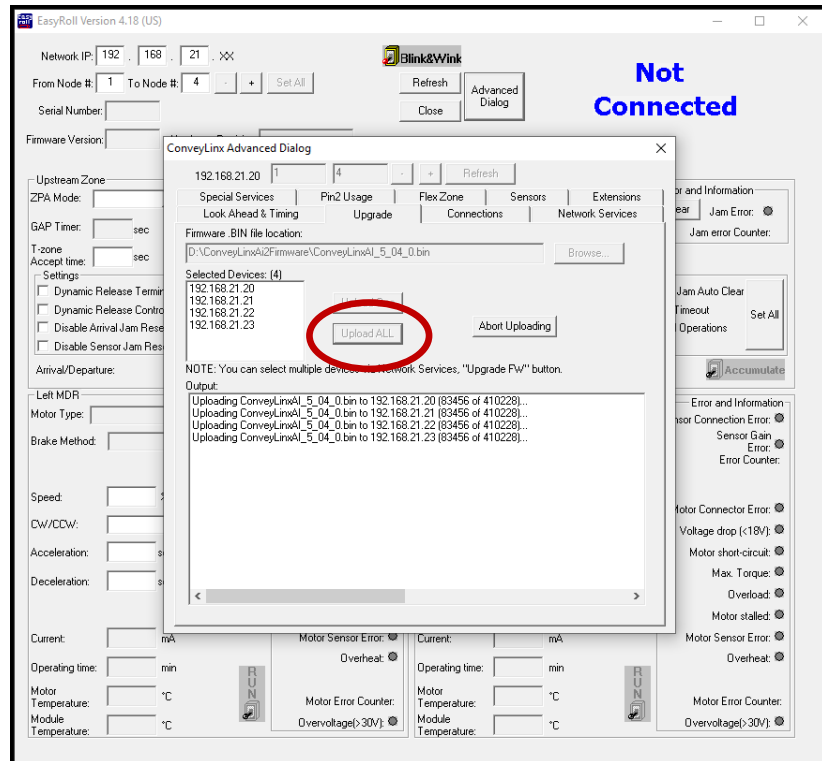
Upon selecting the *Upgrade* screen tab, *EasyRoll* fills in the I.P. address of the range of *Nodes* entered on the main screen. Click the *Browse* button to open a file selection dialog window.



With the "Open" dialog displayed, navigate to the location on your PC where you placed the firmware upgrade file you received. Select the file and click *Open*.

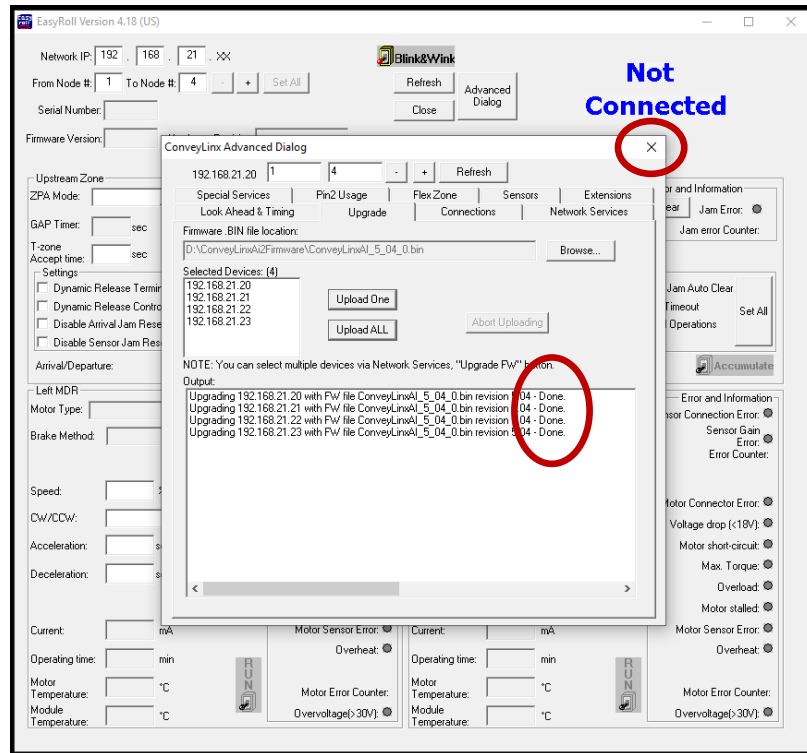


In this example, we clicked *Upload ALL* so the selected firmware upgrade file will be sent to all 4 Nodes. The *Output* window will update the progress of the file uploading process. The time it takes for this process will vary depending upon how many Nodes are being uploaded.





When all *Nodes* report back to the *Output* window with a status of *Done*; then the upload is complete, and you can close the *ConveyLinx Advanced Dialog* window.



Please note that if you upgrade firmware, all of each module's settings (motors, speeds, ZPA options, etc.) are preserved.

CONNECTIONS TAB

The *Connections* utility uses *EasyRoll* to instruct a given *Module* to make a logical connection to another *Module* that it otherwise would not have made during the *Auto-Configuration Procedure*. For applications where you have more than one *ConveyLinx Subnet*, this would be the way to logically connect the most downstream *Node* of one *Subnet* to the most upstream *Node* of another *Subnet*.

CONNECT TWO NETWORKS TOGETHER

Figure 48 shows a typical boundary between two *Subnets*. The most downstream *Node* of the first *Subnet* has an I.P. address of 192.168.21.23 and the most upstream *Node* of the second *Subnet* has an I.P. address of 192.168.22.20.

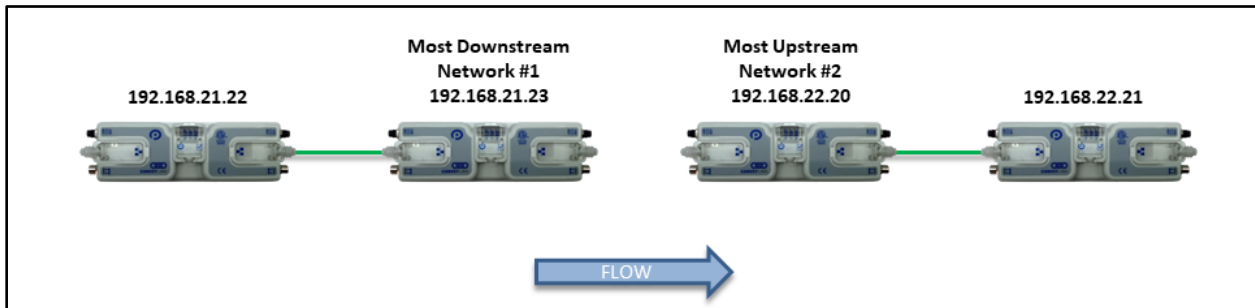


FIGURE 48 - SUBNET BOUNDARY EXAMPLE

By simply connecting a crossover Ethernet cable between these two boundary *Nodes* and then using *EasyRoll* establish the “logical” connection between the two *Subnets*; you can achieve seamless flow between the two networks. This is shown in Figure 49.

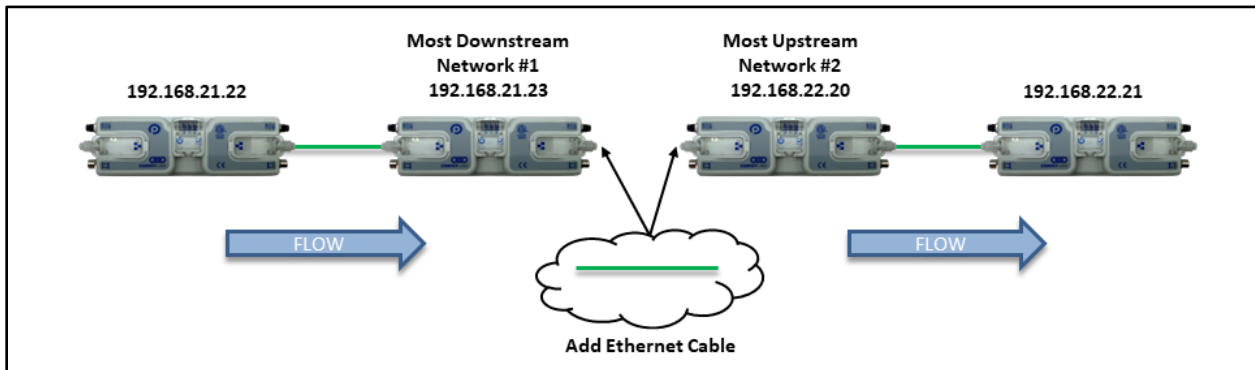
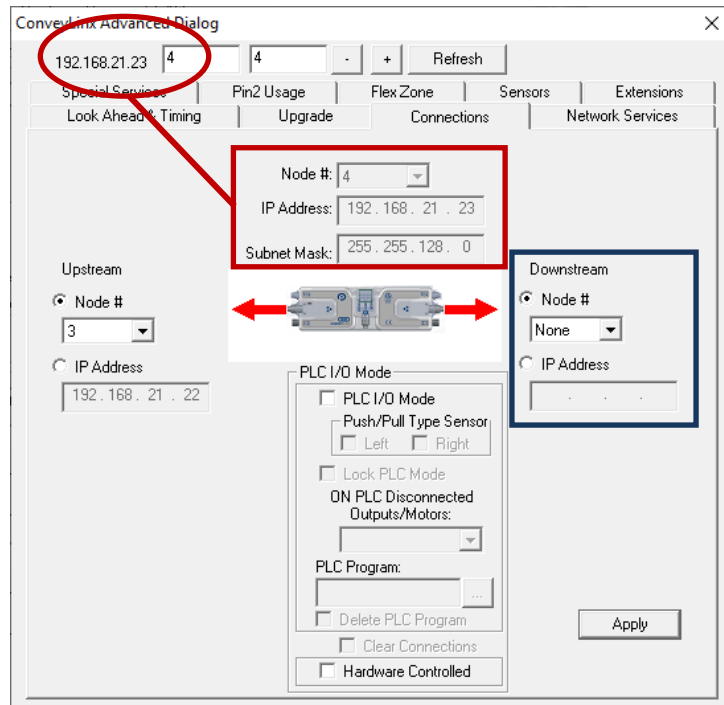


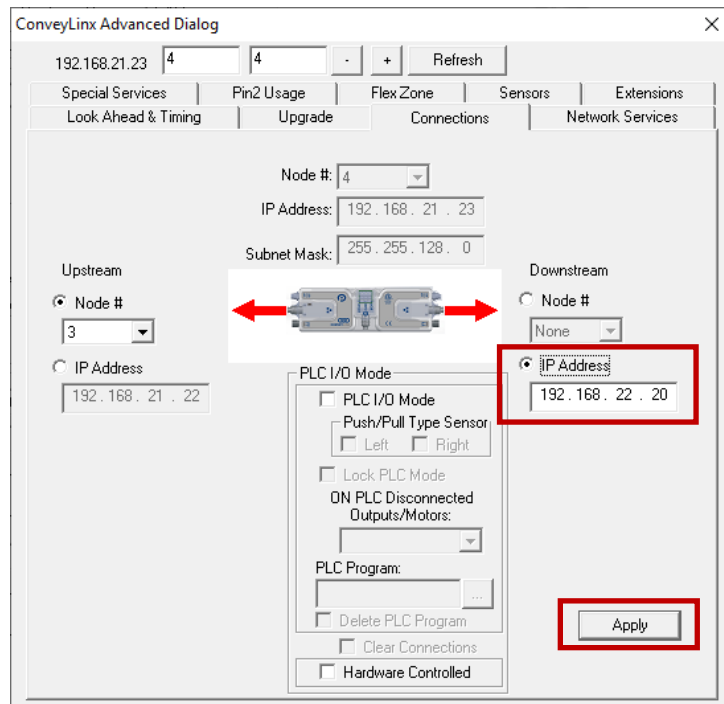
FIGURE 49 - SUBNET BOUNDARY EXAMPLE WITH CABLE

The procedure requires that you must instruct *Node* at 192.168.21.23 to convey cartons to *Node* at 192.168.22.20, and likewise you must instruct *Node* at 192.168.22.20 to accept cartons from *Node* at 192.168.21.23.

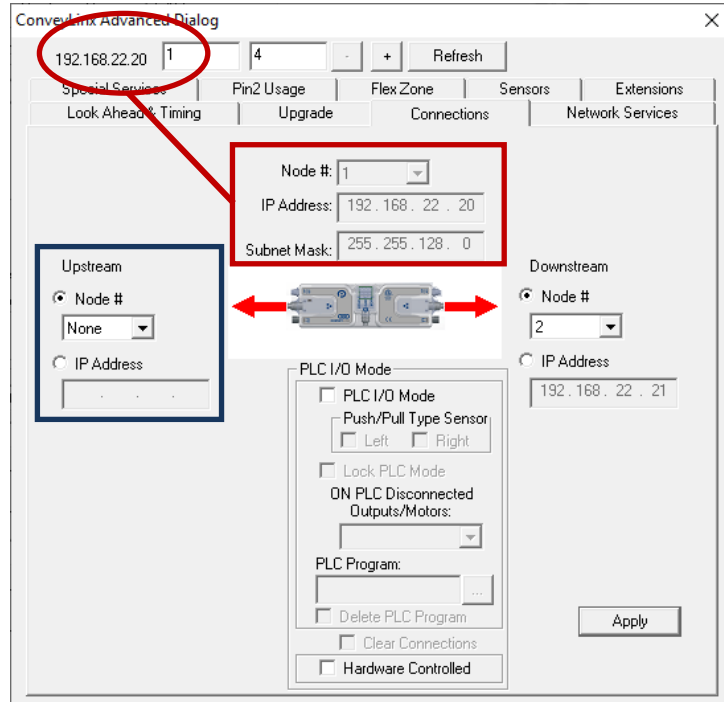
Navigate to Node 4 of the 192.168.21 subnet (i.e. 192.168.21.23). Notice that the module's network data appears in the center. Also notice that the Downstream connection for this Node is *None*.



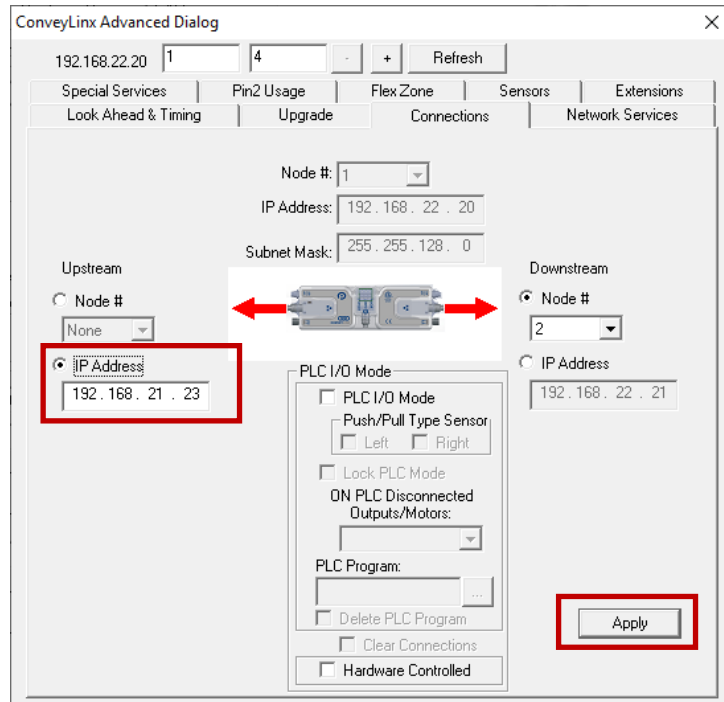
Enter 192.168.22.20 as the I.P. address for Node 4's new Downstream connection. Click *Apply* to make the change. Please note that it will take a few seconds for this to complete.



Navigate to Node 1 of the 192.168.22 subnet (i.e. 192.168.25.22). Notice that the module's network data appears in the center. Also notice that the Upstream connection for this Node is *None*.



Enter 192.168.21.23 as the I.P. address for Node 1's new Upstream connection. Click *Apply* to make the change. Please note that it will take a few seconds for this to complete.





The above example requires that your PC can access multiple *Subnets*. Please refer to *Appendix C—Configuring PC for Ethernet Subnets* for further details.



Further description and application examples of Ethernet networked solutions are included in separate Insight Automation publication *ConveyLinx Developer's Guide* (publication *ERSC-1500*)

NETWORK SERVICES TAB

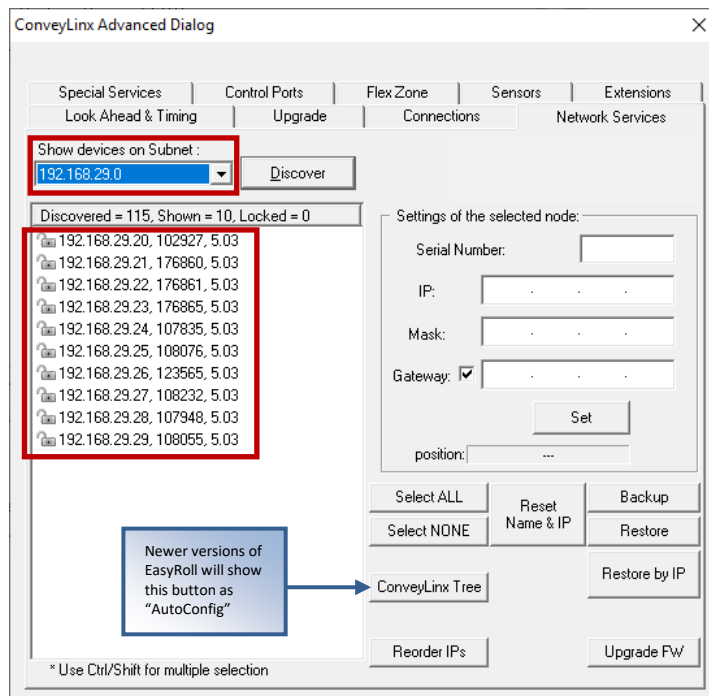
The *Network Services* screen provides multiple functions related to module and network management. These functions are:

- Discover and IP Address Set
- Backup and Restore
- Firmware Upgrade

DISCOVER AND IP ADDRESS SET

The *Discover* function was introduced previously in section *Auto-Configuration Procedure* on page 34. What is not specifically covered in that section is the ability to filter subnets to display in the discovered module window.

In this example there are 115 module devices discovered, however we are only interested in seeing the modules on subnet 192.168.29. By selecting this subnet from the drop-down box; only those modules in that subnet are displayed in the discover list

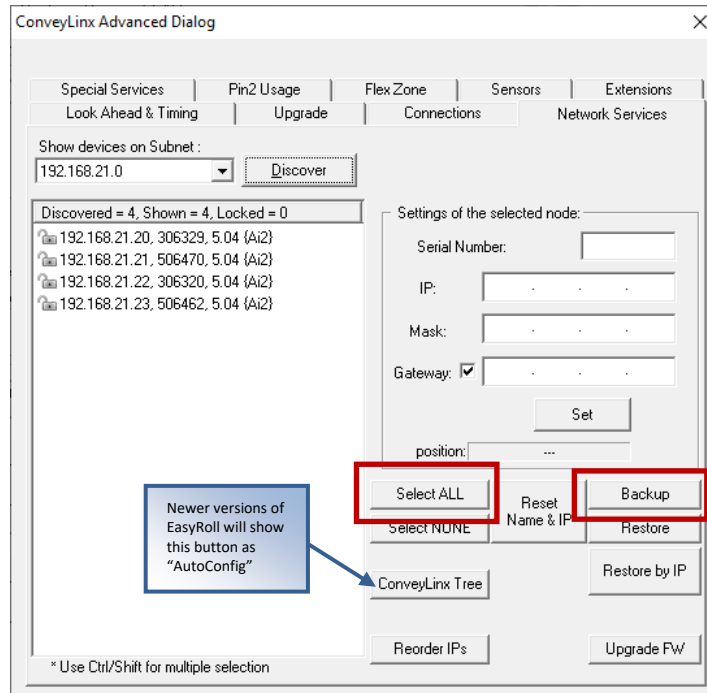


You also can manually set the I.P. Address for a given module from the *Network Services* tab. This was described previously in section *Method 3 - Change Auto-Config Master I.P. Address* on page 54.

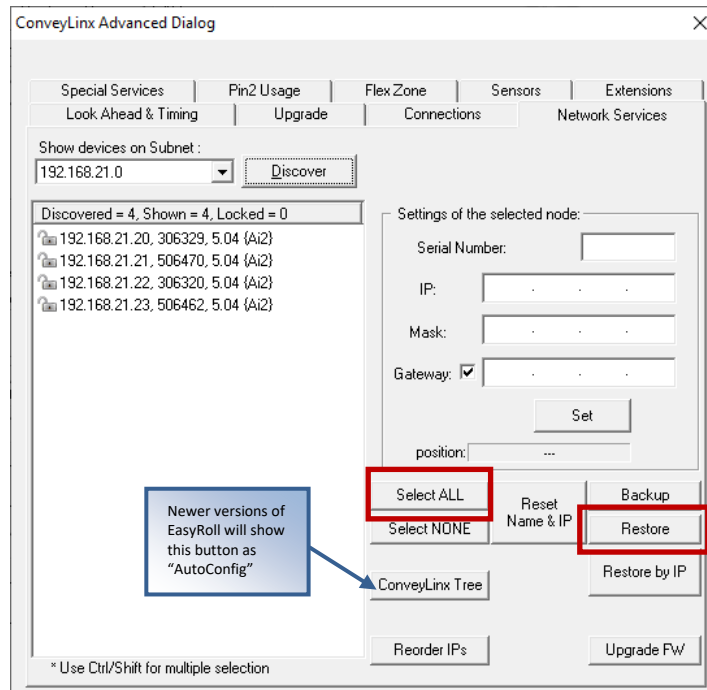
BACKUP AND RESTORE

You can select a subnet, or all subnets discovered and generate a *Backup* file that will contain all the parameters and settings for each *module* included in the selection. This means all motor settings (speed, accel, decel, braking, etc.), ZPA settings, Advanced Dialog settings, etc. are captured in this file that can be saved on your PC. Conversely you can use this *Backup* file to *Restore* settings to a subnet or all subnets in the event settings are inadvertently modified or you simply want to return your subnets and modules to a previously known state.

To perform a backup, click the *Select ALL* button to select all the items in the list. In this example we are going to backup subnet 192.168.21. Once all *modules* are highlighted, click the *Backup* button. A "Save As" file dialog will appear, and you provide a filename and location to save the file.



Conversely, if you have a Backup file that you want to use to get your subnet's settings restored; click the *Select ALL* button and then click the *Restore* button. An "Open File" dialog will appear for you to navigate to the location of your backup file.





Please note that the Restore function will only restore settings to modules that have a matching Serial Number in the Backup file. For situations where module serial number are different, but functionality still needs to be restored, you will need to use the Restore by IP function.

RESTORE BY IP ADDRESS

Because the default *Restore* function restores settings by module Serial Number only, in situations such as duplicating a subnet or restoring functionality from an older backup where some of the modules were replaced since the Backup file was generated, you need to restore the settings by IP address instead of by module Serial Number. To do this you follow the same restore procedure as previously shown except you click the *Restore by IP* button instead of the *Restore* button

BACKUP AND RESTORE RECOMMENDATIONS AND TIPS

Sometimes there are situations where just because a software application will allow you to do something does not always mean that you should. The *Backup* and *Restore* functions in *EasyRoll* can fall into this scenario. Even though you can technically create a backup file for a few or even a single *module* from within a subnet of many *modules*, it is not recommended that you do so. *ConveyLinx* support engineer's experience to date has indicated that when customers perform *Backup* and *Restore* functions for, at a minimum, all *modules* in a subnet, you will have fewer or no problems with your *ConveyLinx* networks. Systems that were once working and then start producing unexpected results often stem from performing a *Restore* function to a small portion of *modules* instead of the entire subnet and/or starting with a backup file that did not include all *modules* in the subnet. So, here is a list of tips:

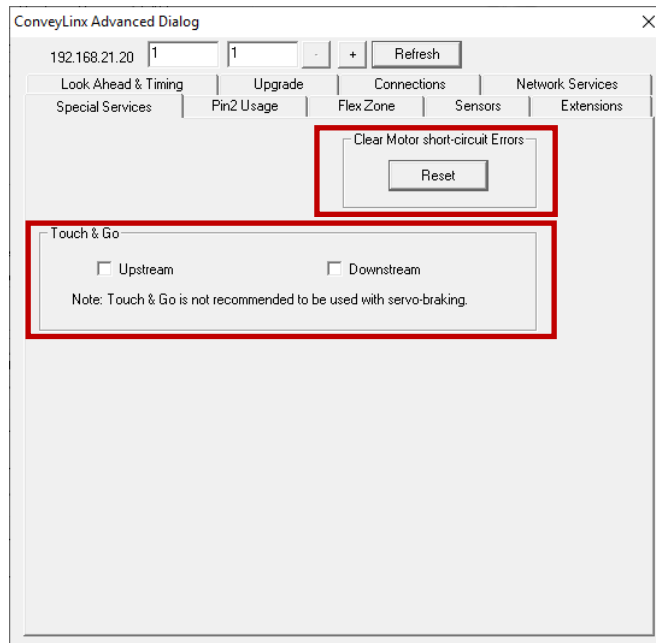
- When you perform a *Backup*; at a minimum, select all modules in a given subnet
- When you perform a *Restore*; at a minimum, select all modules in a given subnet
- Perform a new *Backup* after you make any settings changes to one or more modules in a subnet
- Perform a new *Backup* after every time you perform an *Auto Configure Procedure*

SPECIAL SERVICES TAB

One function on the *Special Services* screen is a button used to clear an MDR short circuit error. This error is not logically cleared based upon an elapsed period timeout or other such reset. An MDR short circuit error requires that either the *Module* be powered down and then powered back up or by clicking the *Reset* button on this screen. This function is made available in *EasyRoll* as a convenience, so you don't have to cycle the power on the *Module*.

The other function on the *Special Services* screen is *Touch and Go*. This function, when enabled, allows the MDR to detect motion on the roller surface and to use this to signal a zone wake-up condition. For example, an operator can place a carton in the zone and give it a gentle push in the direction of flow and the zone will automatically wake-up. There are check boxes for both the upstream and downstream zones to enable this function per zone.

Please note that the single *Reset* button works for both left and right motors.



SENSOR PORT AUX I/O PIN 2 USAGE

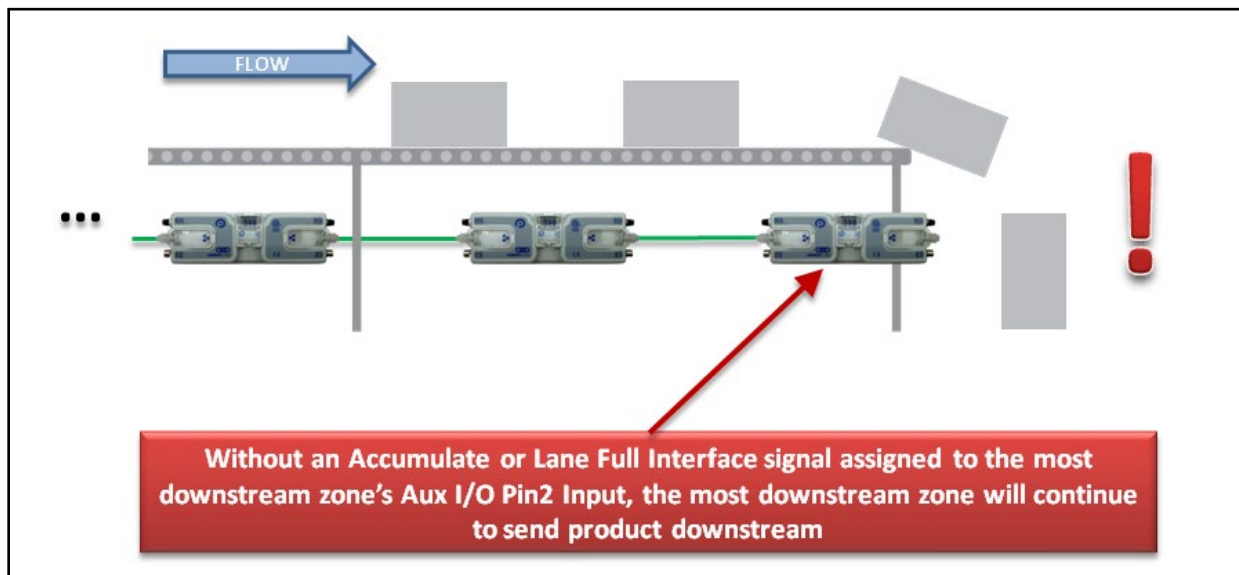
Pin 2 on each of the two *Sensor* port's M8 connector on the *Module* is configurable as to its potential function. This pin can function as either an input or an output. The default "out-of-the-box" usage for Pin 2 is "Not Used". Using the *Pin 2 Usage* screen from the *ConveyLinx Advanced Dialog* allows you to select one of the following functions for each zone on the module:

- None: No ZPA Function but is available to be read as input by remote PLC
- Accumulate: Input for local zone accumulate command
- Wake up: Input for local zone wake-up signal
- Wake-up with Timeout
- Lane Full Interface: Input for local Lane Full Interface signal
- Module Error Output
- Product on Zone Output
- Sensor Error Output
- Mirror Pin 4

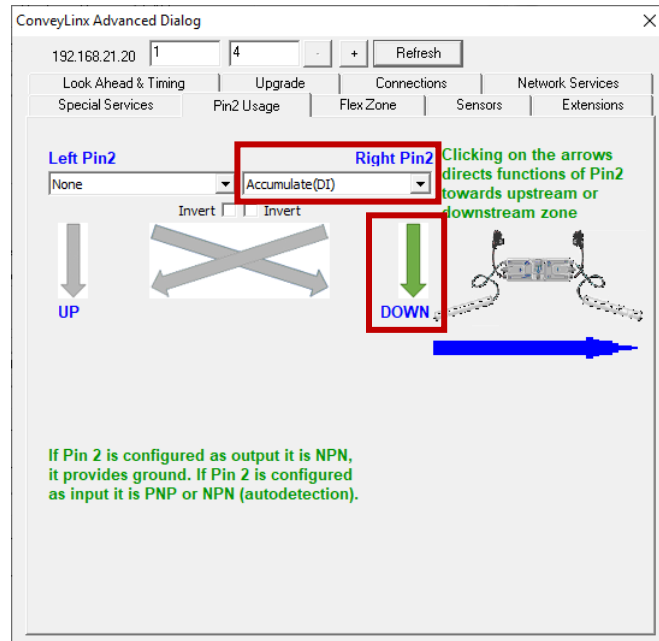
Depending on how the module is configured, you can independently select which of these functions you want to reside on which of the two available sensor port Pin 2 signals.

MOST DOWNSTREAM ZONE

Please note that by default and without any intervention, the most downstream zone will always try to discharge product. To control this, you need to utilize the Aux I/O Pin 2 signal for the most downstream zone as an Accumulate input.

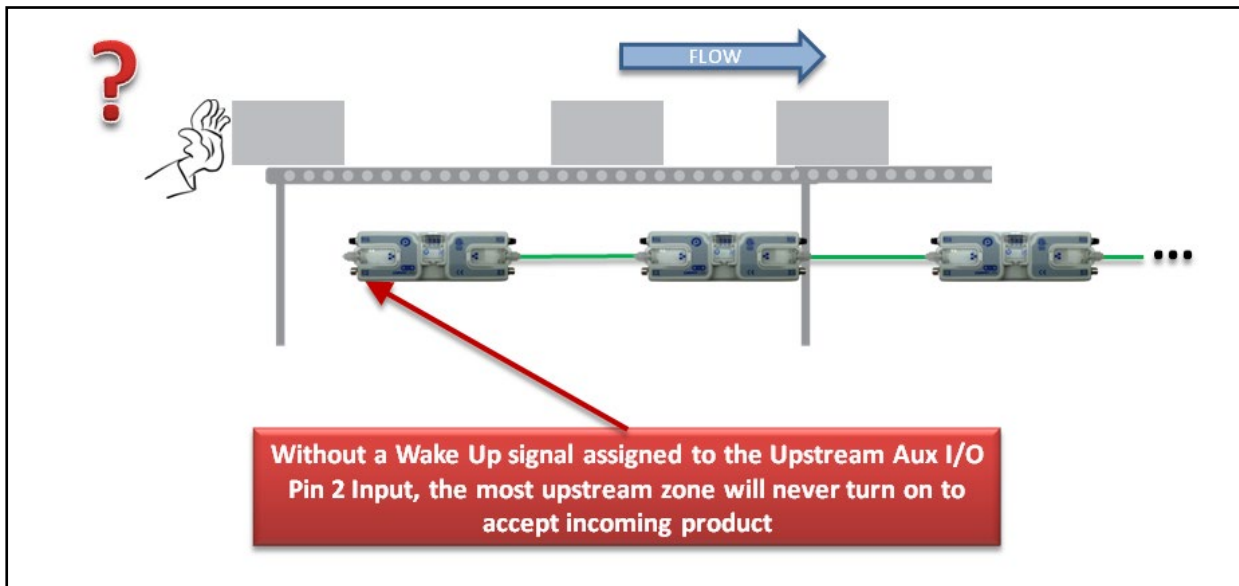


Assuming the most downstream zone is connected to the right side of the module; we set the Right Aux I/O Pin 2 to *Accumulate* from the drop-down box and make sure we click the “DN” arrow to indicate that the Right Pin 2 signal is to be associated with the Downstream Zone. When the Right Pin 2 signal is energized, the downstream zone will stop when an item arrives on its sensor.

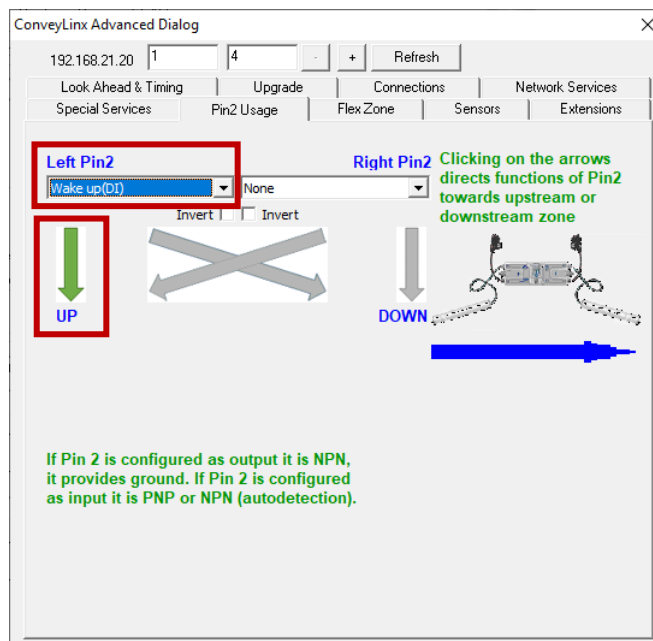


MOST UPSTREAM ZONE

Similarly, by default and without any intervention, the most upstream zone will never turn on to accept new product. To cause the most upstream zone to run to accept an item with a wired signal, you need to utilize the Aux I/O Pin 2 for the upstream zone as a Wake-up input.

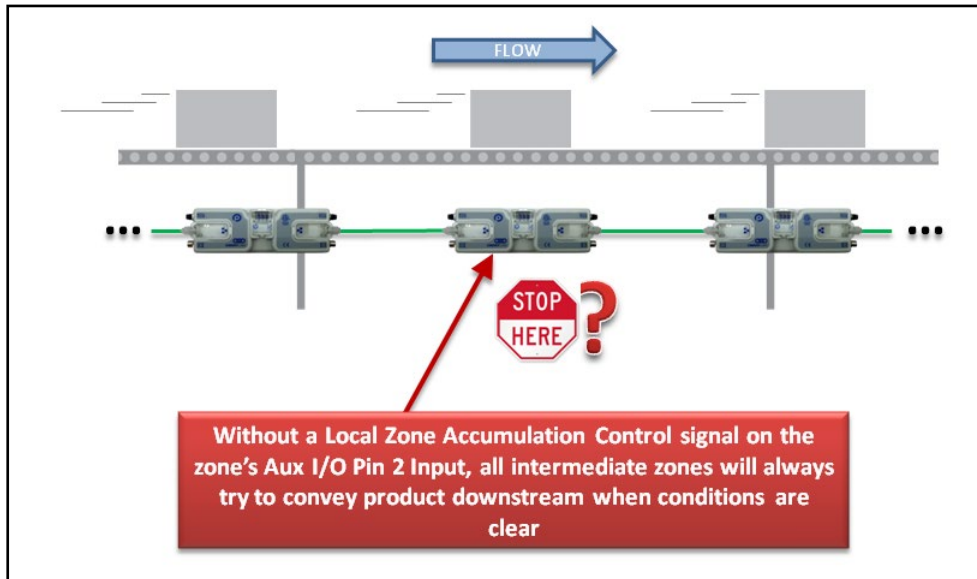


Assuming the most upstream zone is connected to the left side of the module; we set the Left Pin 2 to *Wake up* from the drop-down box and make sure we click the *DN* arrow to indicate that the Left Pin 2 signal is to be associated with the Upstream Zone. When the Left Pin 2 signal is energized, the upstream zone will run to accept an item.

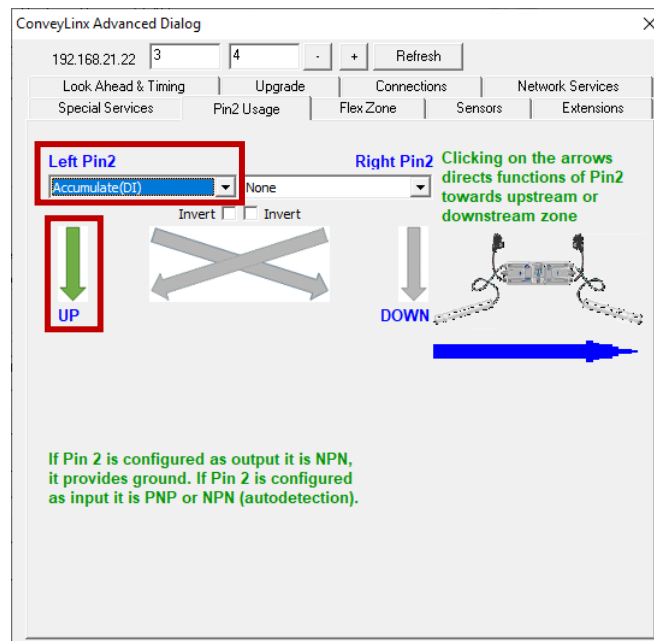


ACCUMULATE INTERMEDIATE ZONE

By default, and without intervention; all zones in between the most upstream and most downstream zones always try to convey items downstream if the next downstream zone is clear. To cause an intermediate zone to accumulate based upon a wired signal, you need to utilize the Aux I/O Pin 2 signal for the zone in questions as an Accumulate input.



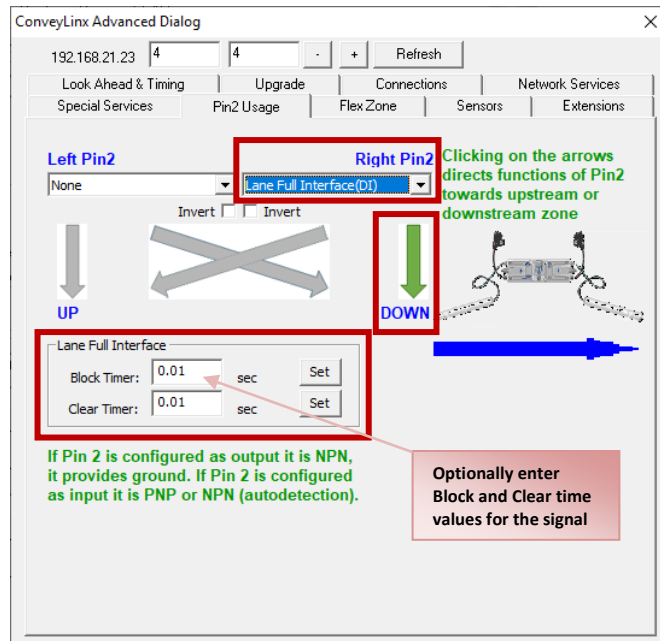
Assuming the intermediate zone we want to accumulate is the upstream zone and the upstream zone is connected to the Left side of the module; we set the Left Aux I/O Pin 2 to *Accumulate* from the drop down box and make sure we click the "UP" arrow to indicate that the Left Pin 2 signal is to be associated with the Upstream Zone. When the Left Pin 2 is energized, the upstream zone will accumulate the next item that arrives.



LANE FULL INTERFACE

A special case of the accumulate signal for the most downstream zone is referred to as Lane Full Interface. When Lane Full Interface is used on the most downstream zone; the input signal is treated with a block and clear timer such that when the signal is energized, the signal must remain energized for the “block” timer duration. When the block timer expires, then the zone is set to accumulate. Similarly, when the signal is de-energized, the signal must remain de-energized for the “clear” timer duration. When the clear time expires, the zone is set to release as normal. The Lane Full Interface also disables the Arrival Jam detection logic such that no arrival verification signal from downstream is required. This means that if the signal is on (and the block time has expired) items arriving at the most downstream sensor will immediately release.

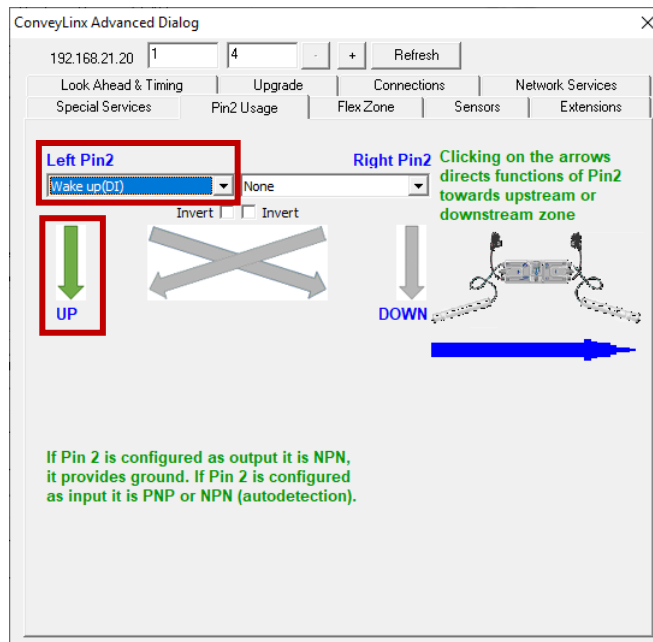
Assuming the most downstream zone is connected to the right side of the module; we set the Right Aux I/O Pin 2 to *Lane Full Interface* from the drop-down box and make sure we click the *DN* arrow to indicate that the Right Pin 2 signal is to be associated with the Downstream Zone. The signal must be energized for the *Block* time period before cartons will stop and accumulate and the signal must be de-energized for the *Clear* time period before cartons will be allowed to release.



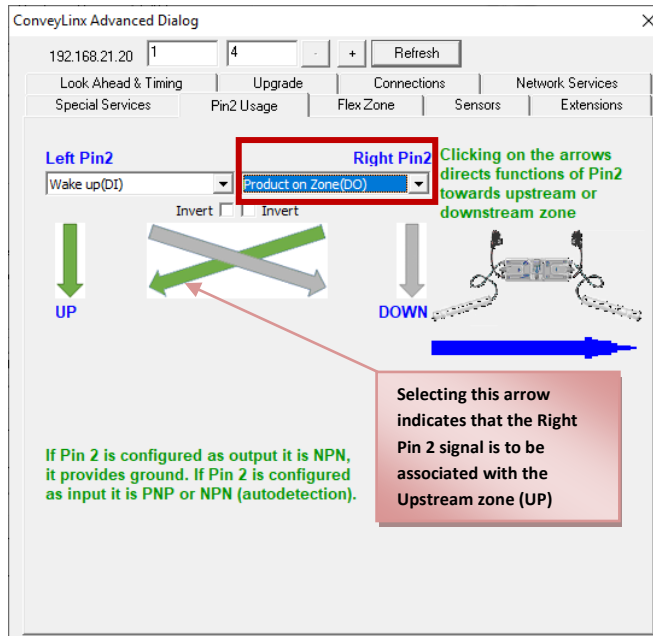
MOST UPSTREAM ZONE HANDSHAKE INTERLOCK

In applications where the equipment feeding the most upstream zone of ConveyLinx controlled conveyor requires a handshake interlock to know when the most upstream zone of the ConveyLinx controlled conveyor is empty and ready to accept a new item, this can be achieved by utilizing both the Left and Right Aux I/O Pin signals. One of the Aux I/O Pin 2 signals needs to be set as an input to Wake Up the zone and the other signal needs to be configured as an output to indicate whether there is Product on Zone. When this Product on Zone output is energized, then the feeding equipment knows that the most upstream zone is occupied and is not ready to accept a new item.

Assuming the most upstream zone is connected to the left side of the module; we set the Left Pin 2 to *Wake Up* from the drop-down box and make sure we click the *UP* arrow to indicate that the Left Pin 2 signal is to be associated with the Upstream Zone.



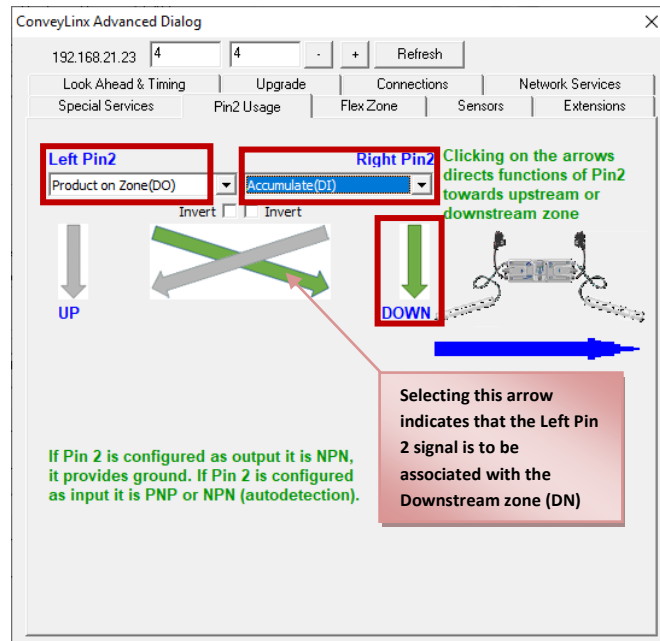
Then we select *Product on Zone* for the Right Pin 2 signal and click the diagonal arrow to indicate that this signal is to reflect the status of the Upstream zone



MOST DOWNSTREAM ZONE HANDSHAKE INTERLOCK

In applications where the equipment accepting product from the most downstream zone of ConveyLinX controlled conveyor requires a handshake interlock to know when the most downstream zone of the ConveyLinX controlled conveyor is occupied and ready to discharge the item, this can be achieved by utilizing both the Left and Right Aux I/O Pin signals. One of the Aux I/O Pin 2 signals needs to be set as an input to Accumulate the zone and the other signal needs to be configured as an output to indicate whether there is Product on Zone. When this Product on Zone output is energized, then the accepting equipment knows that the most downstream zone is occupied and is ready to discharge the item.

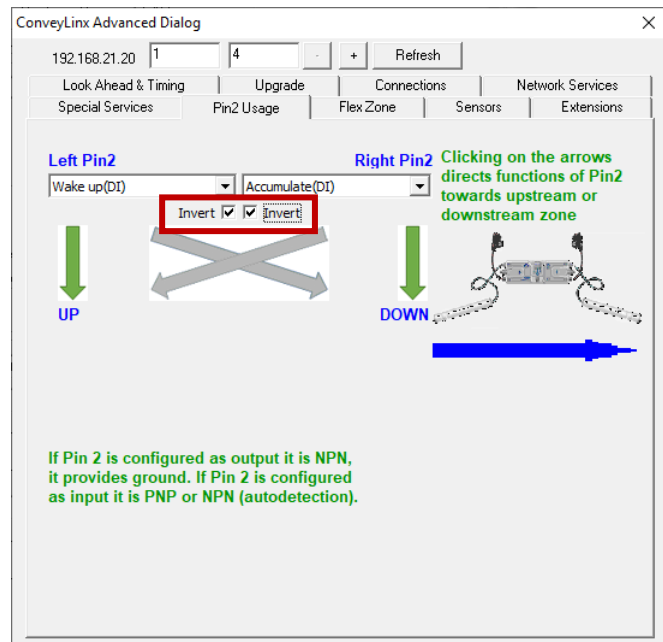
Assuming the most downstream zone is connected to the right side of the module; we set the Right Pin 2 to *Accumulate* from the drop-down box and make sure we click the "DN" arrow to indicate that the Right Pin 2 signal is to be associated with the Downstream Zone. Similarly, we select *Product on Zone* for the Left Pin 2 signal and click the diagonal arrow to indicate that this signal is to reflect the status of the Downstream zone.



INVERTING THE AUX I/O PIN 2 SIGNALS

On this dialog, you can also invert the meaning of the electrical signal by checking the *Invert* box for either or both Pins. In this example, because we have the *Invert* box checked for both Pin signals, their respective functions will be activated when their signal is electrically OFF.

Note that the *Invert* function works similarly for the output signals. If *Product on Zone* is selected as a function, with the *Invert* box checked when the zone is occupied, the electrical signal will be OFF. With the *Invert* box checked, when the zone is clear, the electrical signal will be ON.



Please refer to Appendix B - IOX-2Breakout Module beginning on page 105 for details on connecting and wiring devices for access to Aux I/O Pin 2 signals

FLEX ZONE TAB

Please refer to section *Default Flex Zone Recognition Feature* on page 43 for details on how it works. The *Flex Zone* feature is enabled by default when you perform the *Auto Configure Procedure*. There can be certain situations such as higher speed applications and/or applications where a large percentage of *cartons* are at a length very close to the zone length where a “false triggering” of a flex zone condition can occur. In these situations, when product needs to accumulate, you may see several zones unoccupied because of this false triggering. For these applications where accumulation density is paramount, you can disable *Flex Zone* to eliminate this false triggering situation.

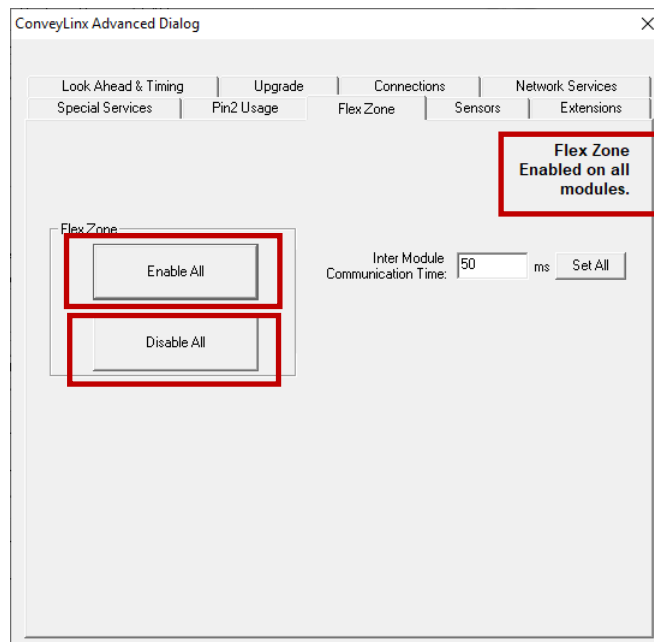


Please note that Flex Zone function must be enabled or disabled for the entire subnet. It cannot be disabled or enabled on a per zone basis or for group of zones within the same subnet.



Flex Zone functionality is only applicable for Singulation Release mode. Flex Zone may not operate properly when using Train or Gap Train release modes.

Click the appropriate button to either Disable or Enable Flex Zone based upon the subnet's current status as indicated. Because this function applies to all modules in the subnet, it does not matter what module you were connected to when you invoked the *Advance Dialog* in order to disable or enable *Flex Zone*

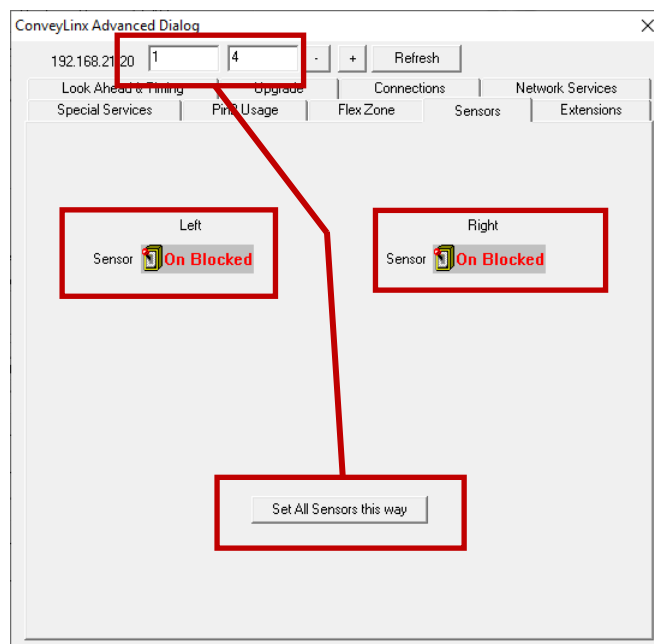


SENSORS TAB

The sensors tab displays the status of how the two sensor signals were configured during the *Auto Configuration Procedure*. If for some reason one or more of the sensors was not configured properly during the *Auto Configuration Procedure*; for example they were not aligned with their reflector or there was an obstruction blocking the sensor at the time the procedure was performed, the *Sensors Tab* will allow you to change the sensor's configuration without requiring you to re-perform the *Auto Configuration Procedure* for the entire subnet.

For example, if all the sensors on the system are light energized normally open then the corresponding zone's sensor graphic on this tab will show *Off Blocked*.

Click the appropriate icon to change the sensor's blocked signal state. Note that you can make the same change for a group of modules by clicking the *Set All Sensors this Way* button.

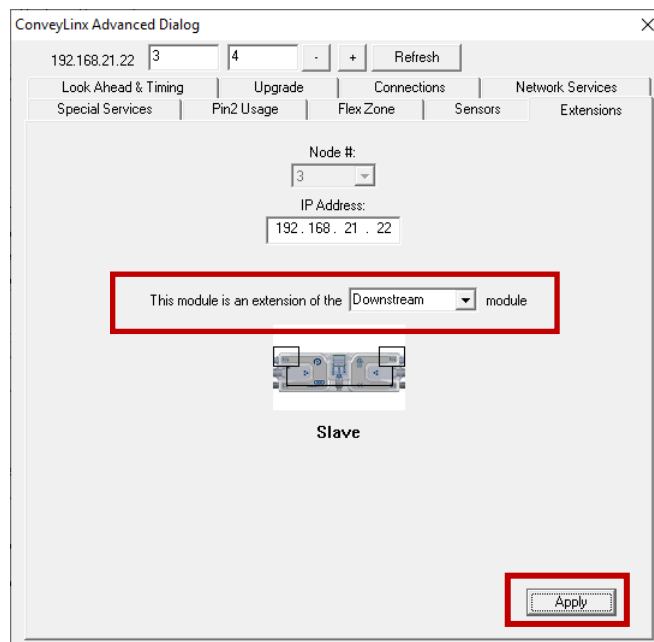


EXTENSIONS TAB

The *Extensions Tab* allows you to extend or “slave” single or multiple zones to one “master” zone. An example situation could be that you have for example certain length zones and on a given conveyor line there is a need for an extra partial zone that is too short to be a functional zone that accumulates a *carton*, but at the same time it is long enough that mechanically you need to have an MDR in that zone. In this situation you would like to provide a *module* and an MDR but no sensor and you want this zone to run its MDR when either its adjacent upstream or downstream zone is also running. In essence, you want to make this partial zone a logical extension to one of its neighbors.

One example of extensions in use can be found in *Appendix D – Application Examples* section *Using Extensions for a Lift Gate* on page 115.

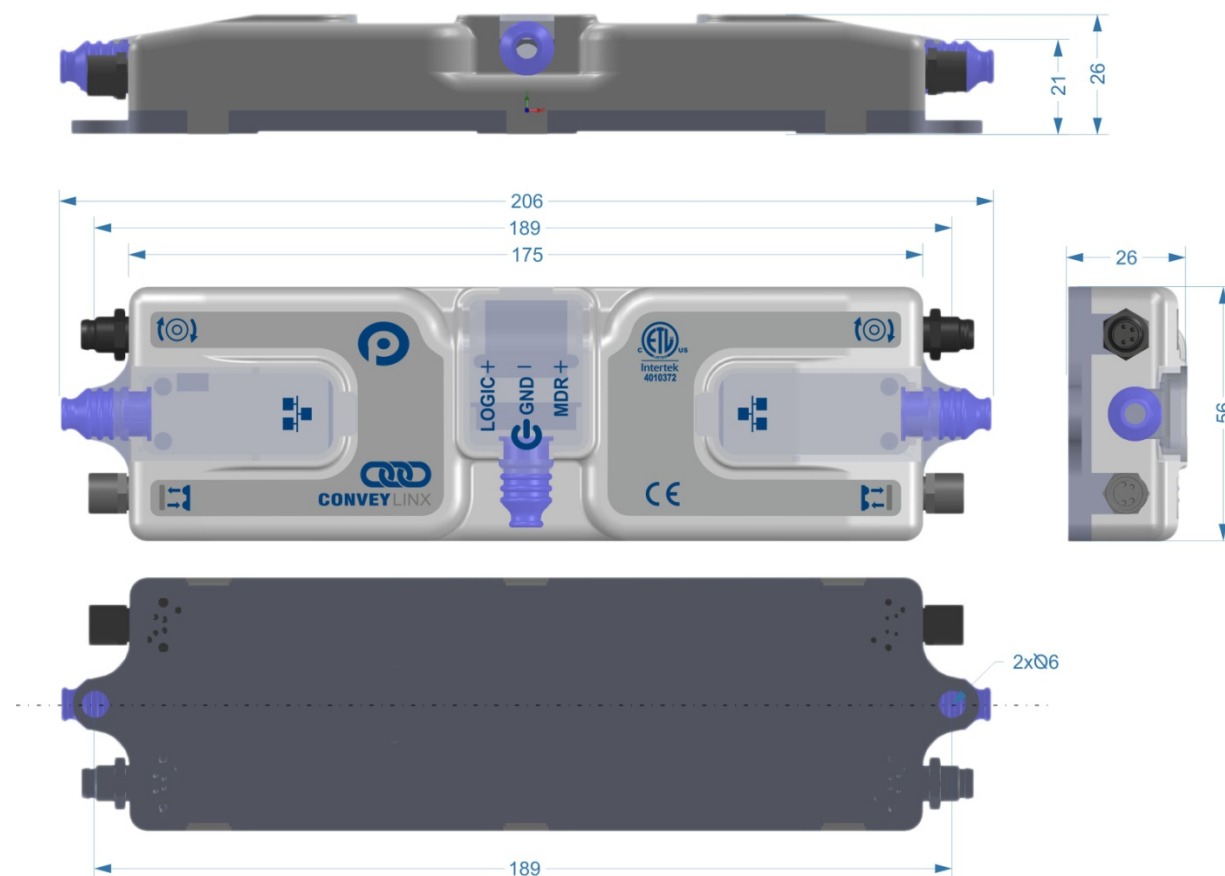
Navigate to the module that is going to be the extension and select either *Upstream* or *Downstream* from the drop-down box. In this example, we selected *Downstream*. Then you need to click the *Apply* button for the change to take place. Please note that this may take several seconds to complete.





APPENDIX A – MODULE DIMENSIONS

Dimensions in mm



APPENDIX B - IOX-2 BREAKOUT MODULE

The IOX-2 breakout module provides a convenient plug and play means to separate the zone sensor and Aux I/O signals on the *Module's* sensor port. The IOX-2 utilizes M8 style connection headers so you can connect your M8 style zone sensor as well as M8 style cable (or additional sensor) for access to the Aux I/O Pin 2 signal. The IOX-2 also contains wire terminal access for the Aux I/O Pin 2 signals for complete flexibility.

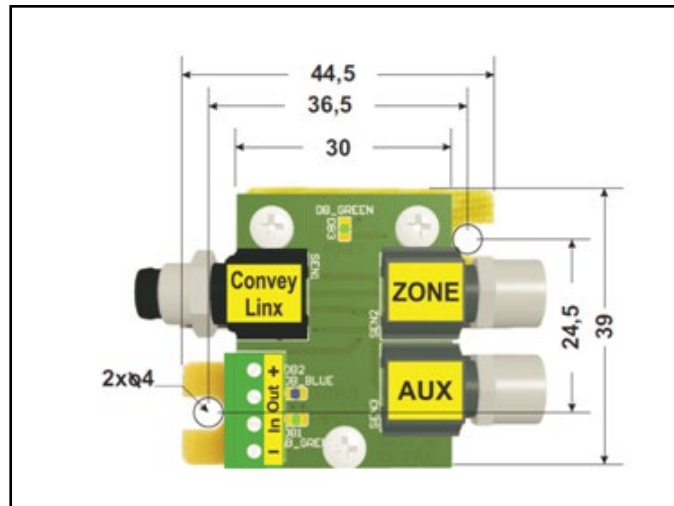


FIGURE 50 - IOX-2 MODULE (DIMENSIONS IN MM)

The following figures illustrate the typical usage and connection details for Aux I/O ConveyLinx-Ai and ConveyLinx-Ai2 applications

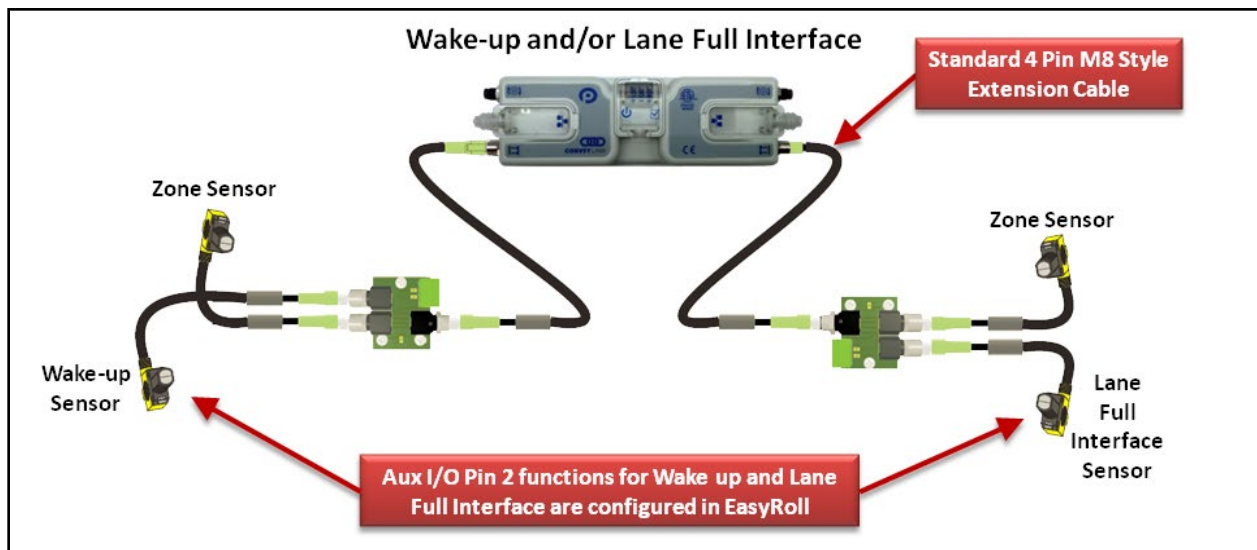


FIGURE 51 - WAKE UP AND LANE FULL INTERFACE SENSORS AS M8 STYLE

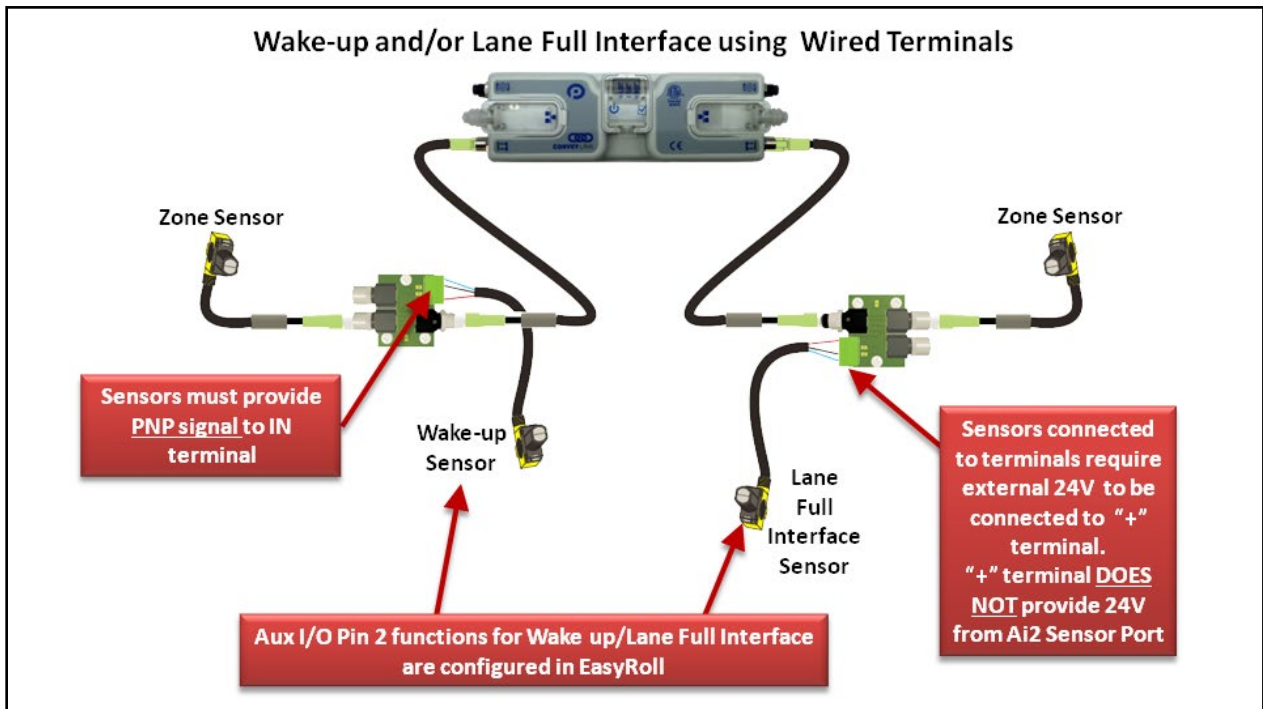


FIGURE 52 - WAKE UP AND LANE FULL INTERFACE SENSORS CONNECTED TO WIRE TERMINALS

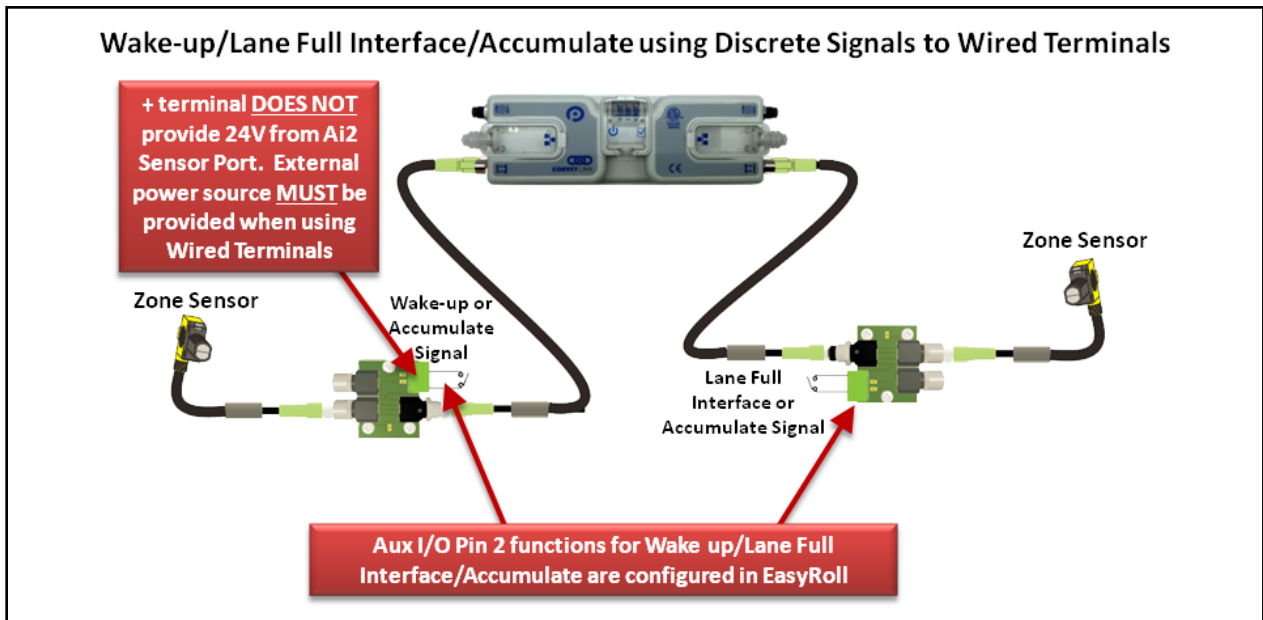


FIGURE 53 - WAKE UP AND LANE FULL INTERFACE SIGNALS AS DEVICE CONTACTS

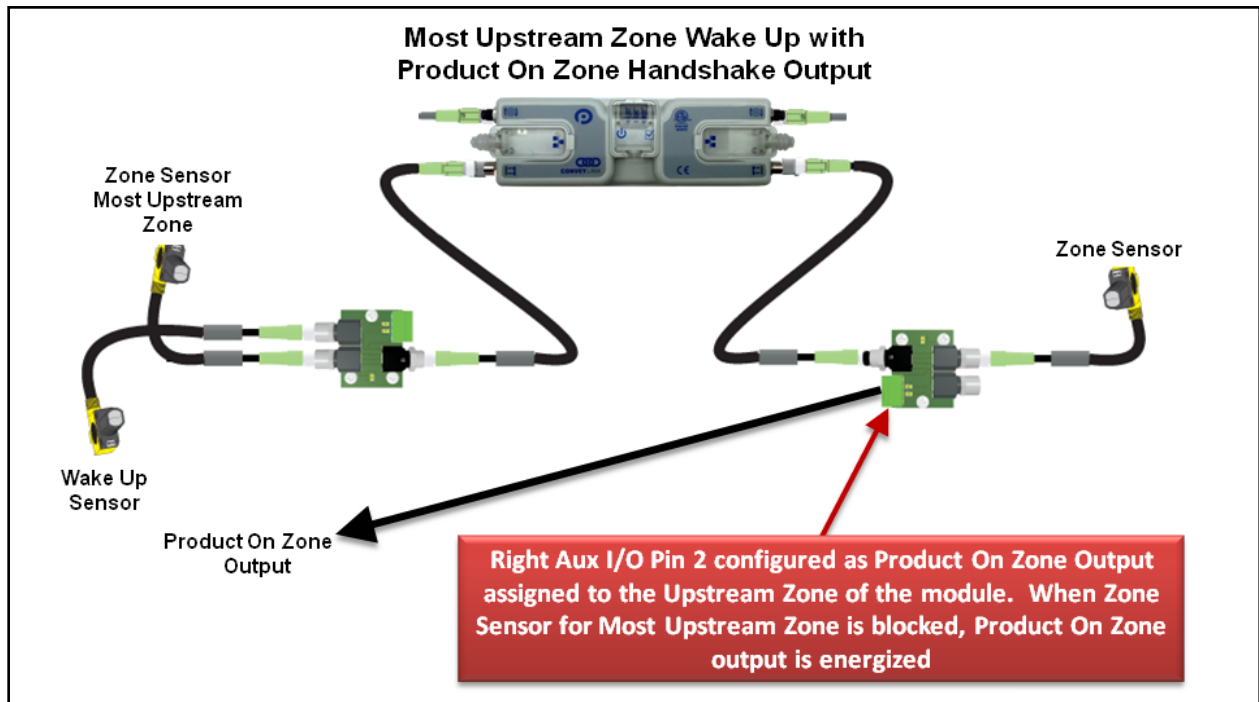


FIGURE 54 - UPSTREAM WAKE UP WITH PRODUCT ON ZONE OUTPUT EXAMPLE

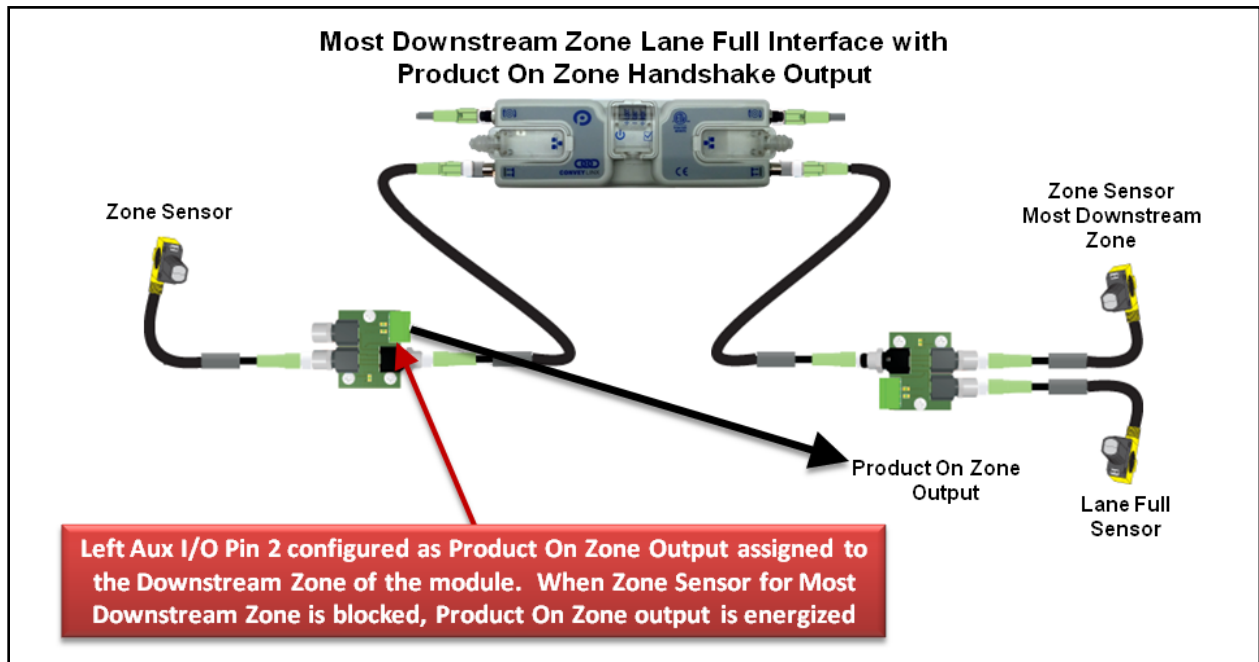


FIGURE 55 - DOWNSTREAM LANE FULL INTERFACE WITH PRODUCT ON ZONE EXAMPLE

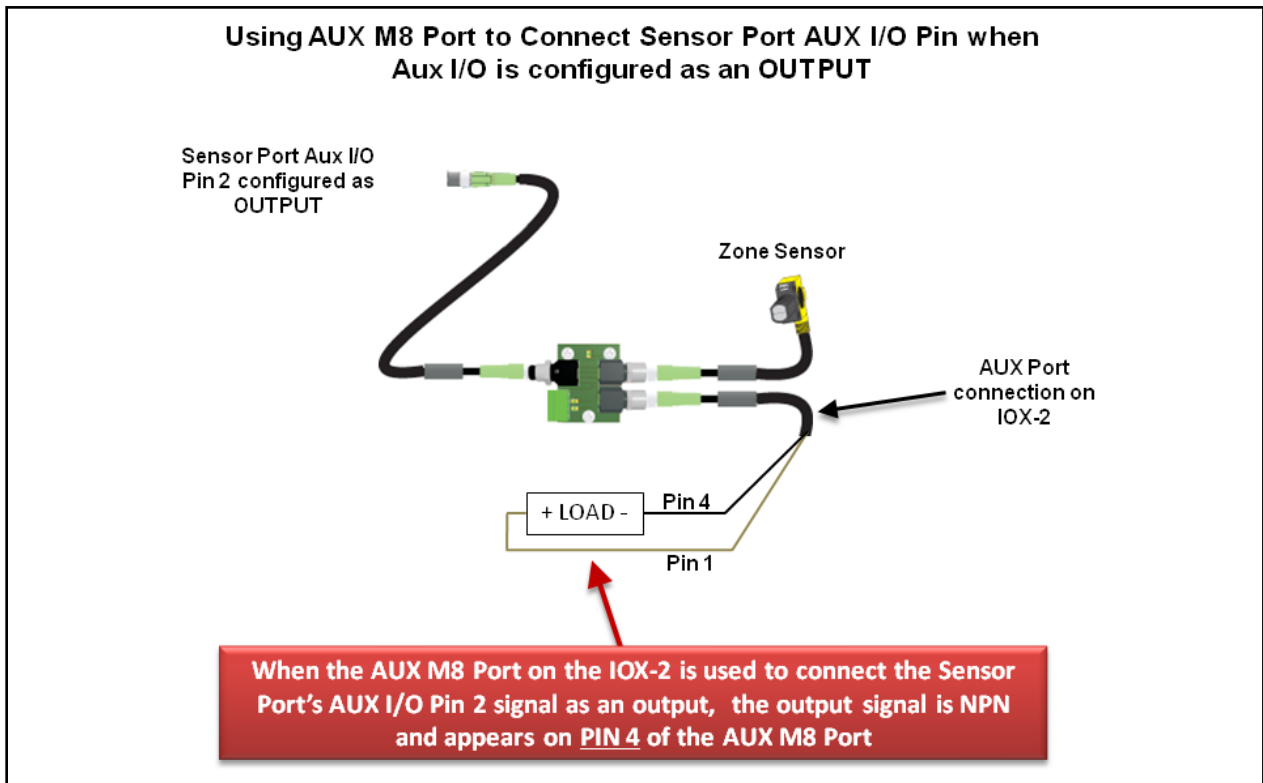


FIGURE 56 - AUX M8 PORT USED AS OUTPUT

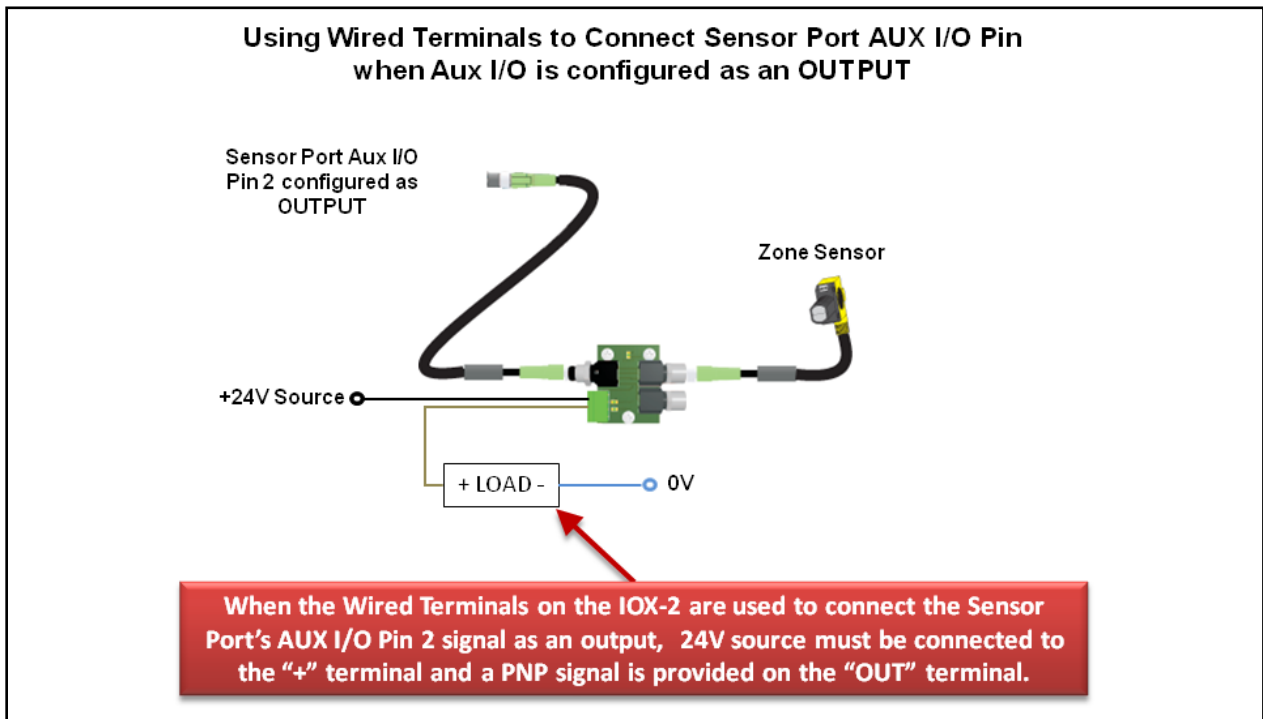


FIGURE 57 - USING WIRED TERMINALS FOR SENSOR PORT AUX I/O CONFIGURED AS AN OUTPUT

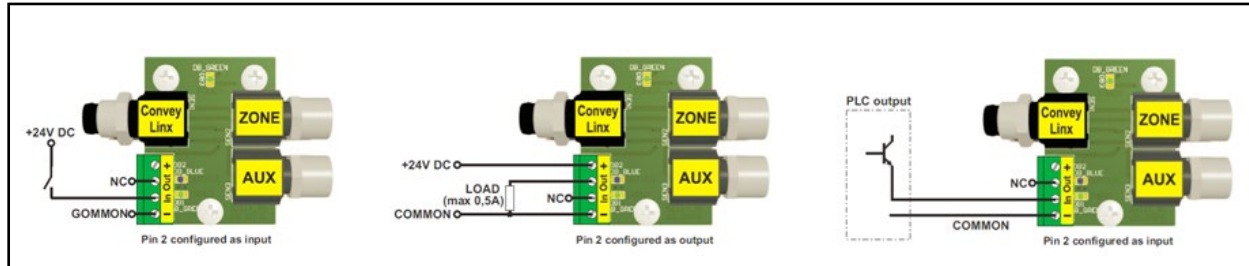


FIGURE 58 - TYPICAL CONNECTION WIRING DIAGRAMS

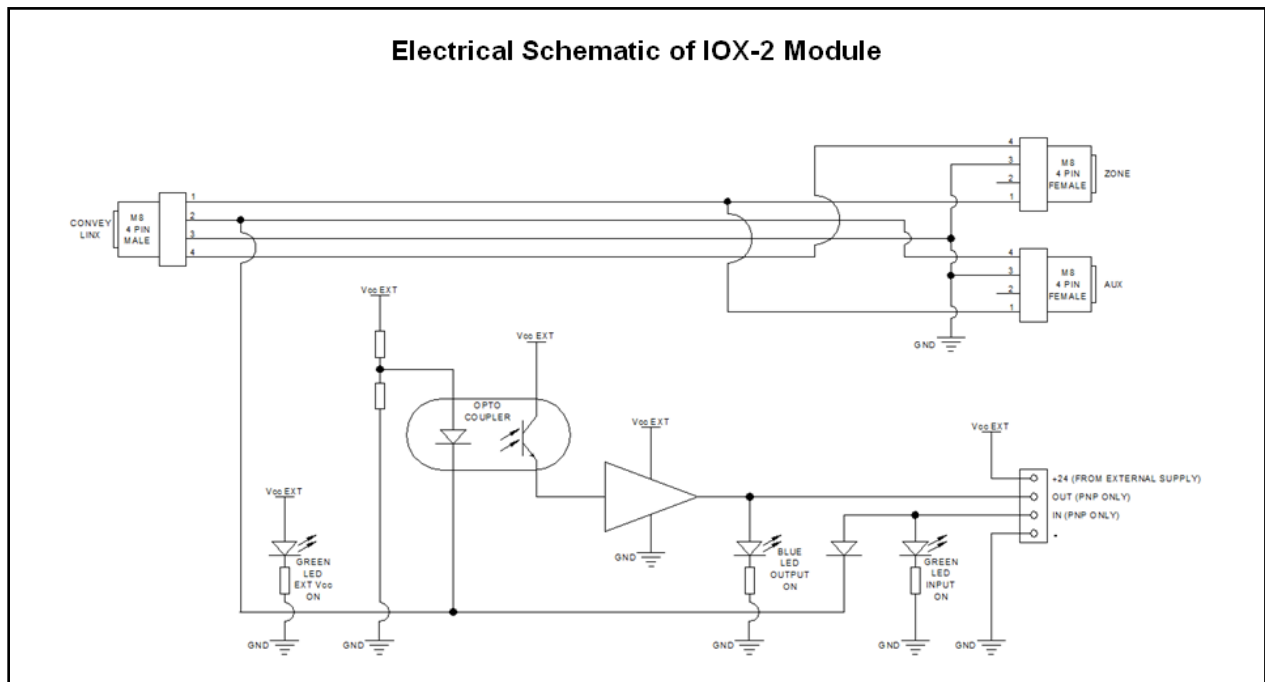


FIGURE 59 - ELECTRICAL SCHEMATIC OF IOX-2 MODULE



APPENDIX C—CONFIGURING PC FOR ETHERNET SUBNETS

CONVEYLINX, IP ADDRESSES, AND SUBNETS

In order to connect to a *ConveyLinx* network and/or utilize and manage a multiple subnet *ConveyLinx* conveyor installation; a certain level of Ethernet I.P. addressing knowledge is required. This reference provides some background information and a quick guide for setting up your PC to be able to take full advantage of *ConveyLinx* and *EasyRoll*.

Your PC's I.P. address is used by an Ethernet network to identify the PC on a network. An I.P. address is constructed of 4 numbers or *octets*. Each of the numbers can be a value from 0 to 255. The format of an I.P. address is:

AAA . BBB . CCC . DDD

Where AAA, BBB, CCC, and DDD can theoretically be any values from 0 to 255 each. For any given network, this I.P. address is unique for each PC on the network. The AAA value identifies the *Class* of the network and is most relevant to I.T. professionals and other entities such as internet providers, etc. For our purposes, we will use a *Class C* type network which uses the value 192 for AAA. For the BBB value we will use 168. The 192.168 value for the first 2 octets of our I.P. address is the most common for user configurable networks. The values AAA . BBB . CCC together identify the *Subnet* that the PC will be connected. The *Subnet* can be thought of as a group of PCs or *ConveyLinx* modules that can all communicate directly with each other. For example, if a PC's I.P. *Subnet* (AAA . BBB . CCC) address is 192.168.0; then any other PC or device on the same network whose *Subnet* is equal to 192.168.0 can communicate with each other. In this case, our network can have up to 256 devices because the DDD octet has to be in the range of 0 to 255 and each complete I.P. address has to be unique. Any other PC's or *ConveyLinx* modules on our network whose *Subnet* does not equal 192.168.0 will not be able to communicate with each other.

In order to allow your PC to communicate with more than 256 possible address on its network; your PC's I.P. address configuration also uses another 4-octet value known as the *Subnet Mask*. This value allows your PC to see other *Subnets* on the same network.

The following figure shows some typical values for *Subnet Mask* and the resulting number of *Subnets* that can be addressed:

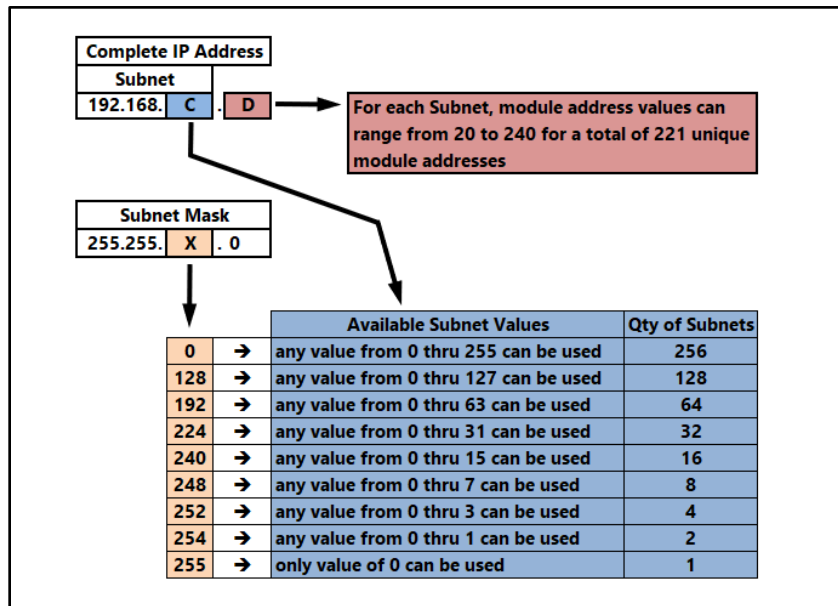


FIGURE 60 - AVAILABLE SUBNETS PER TYPICAL SUBNET MASK VALUES

As you can see, by simply manipulating the *Subnet Mask* values, you can configure your PC to see multiple *ConveyLinx* networks.

CONFIGURATION EXAMPLE

Your PC's I.P. address is used by an Ethernet network to identify the PC on a network. For most office networks, the I.P. address is automatically assigned by your office network or in smaller networks (like a home network) the IP address is assigned by a router device. In some cases, your I.T. department may assign your PC or laptop a fixed I.P. address.

For our example we wish to be able to communicate with up to 4 separate *ConveyLinx Subnets*. With a properly configured PC, we can use *EasyRoll* to view and set parameters for all modules on all 4 networks.

The following figure illustrates how we want our PC's I.P. address settings to be configured:

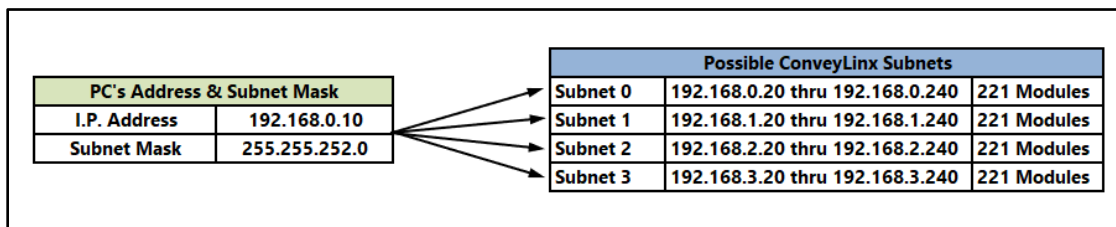


FIGURE 61 - IP ADDRESS CONFIGURATION EXAMPLE

Please Note: The *ConveyLinx* IP address structure is designed such that any given *Modules* last *octet* (DDD) of their address is greater than or equal to 20 and less than or equal to 240. This leaves 35 spare valid addresses (256 – 221 = 35) on the same *Subnet* for other devices such as PC's and PLC's. In our example, the last *Octet* for the PC's



I.P. address is arbitrarily set to 10. This value could be any value from 0 to 19 or 241 to 255. Network conventions are such that on a given *Subnet* the last octet (DDD) values of 0 and 1 are usually reserved for the *Default Gateway* which is often the address of an Ethernet router.

Also note that our example is utilizing all the possible *Subnets* for the Subnet Mask (255.255.252.0) shown. From *Figure 60* above; we could have selected any of the values for X on the chart that was listed above the 252 value. In these cases, there would simply be more *Subnets* available to address.

APPENDIX D – APPLICATION EXAMPLES

USING EXTENSIONS FOR A LIFT GATE

A common use of the *Extension* mode configuration available from the *Connections* tab selection is for a powered lift gate. *Figure 62* shows a typical powered lift gate example. In this example the *module* on the lifting or gate portion of conveyor has 2 MDR's and no photo-sensors. Normal operation when the gate is down is for the MDR's on the gate to run when its immediate downstream zone runs so as to create "one long logical zone". This means that if a *carton* is accumulated on the upstream zone of *Node 192.168.21.23*; a *carton* arriving at the downstream zone of *Node 192.168.21.21* will stop and accumulate and no loads will ever be logically accumulated or stopped on the gate portion. In order to accomplish this, all we need to do is instruct *Node 192.168.21.22* to be an *Extension* of its downstream neighbor *Node 192.168.21.23*.

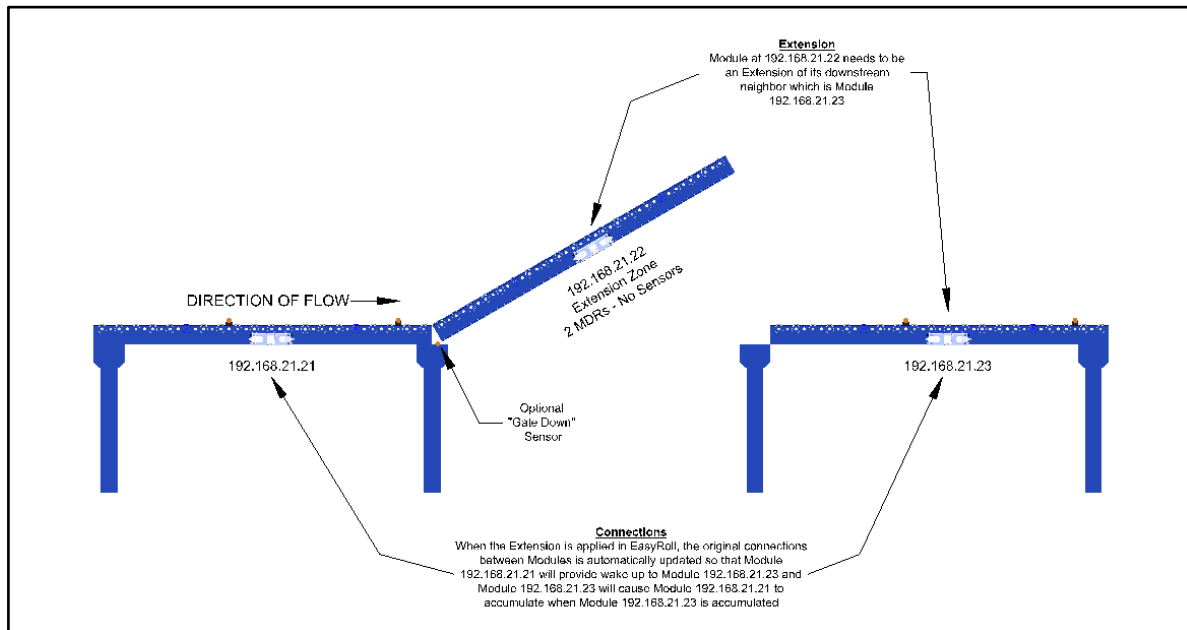
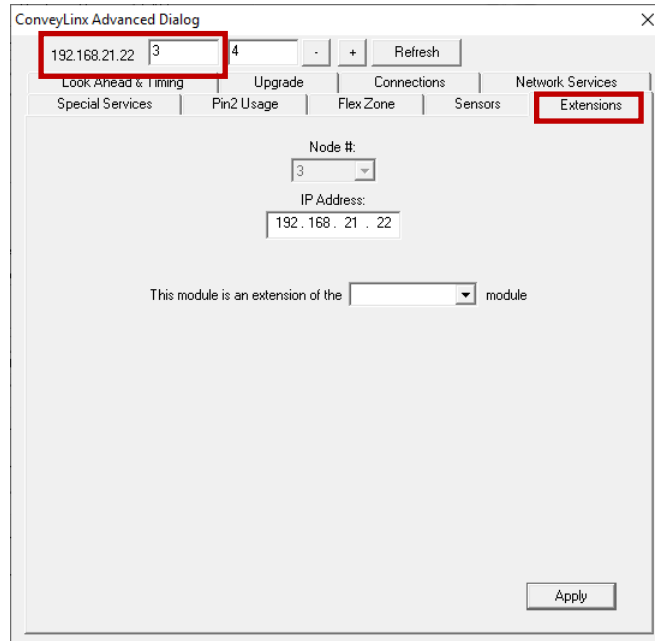
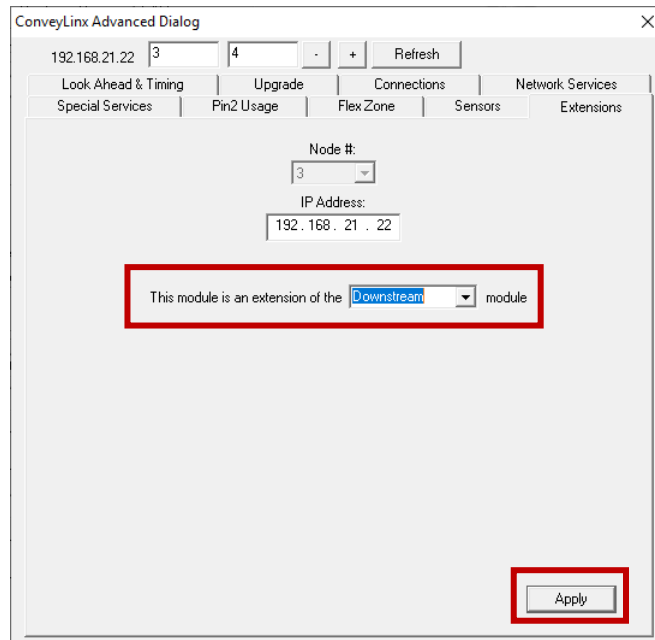


FIGURE 62 - TYPICAL LIFT GATE EXAMPLE

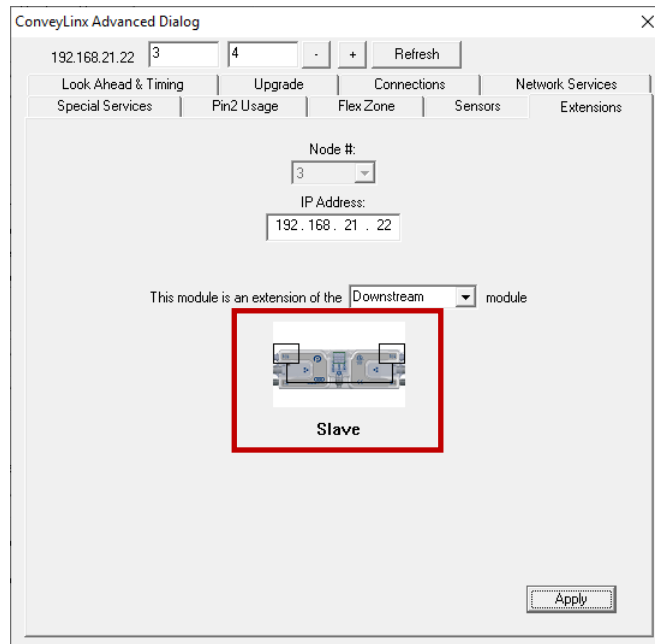
In the *Advanced Dialog*, navigate to *Node 3* and click the *Extensions* Tab. Notice that Node 3's IP address 192.168.21.22 is filled in. In the drop-down box, select *Downstream* and click *Apply*. Note that this may take a few seconds to complete.



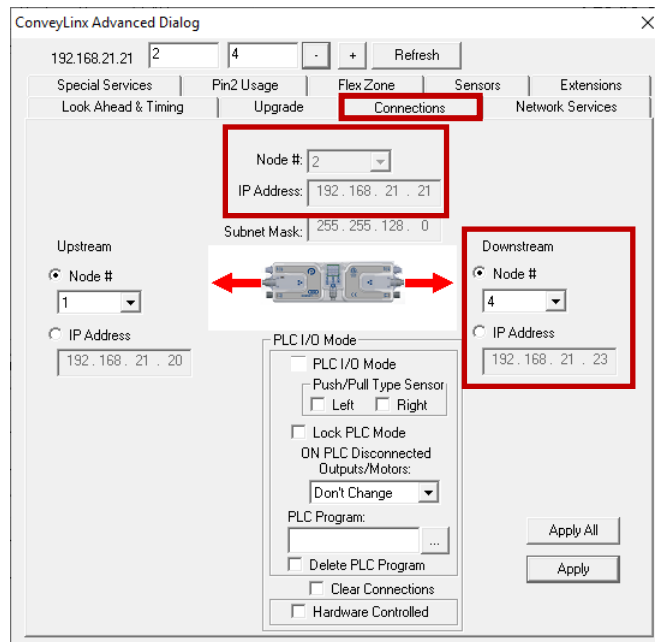
In the drop-down box, select *Downstream* and click *Apply*. Note that this may take a few seconds to complete.



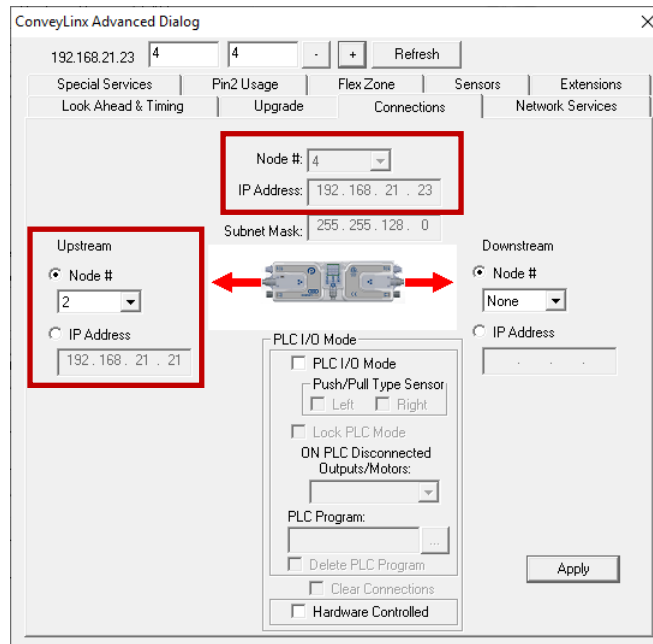
After clicking *Apply*, the screen will update and show you that the module has been configured as an extension or “slave” of its downstream neighbor.



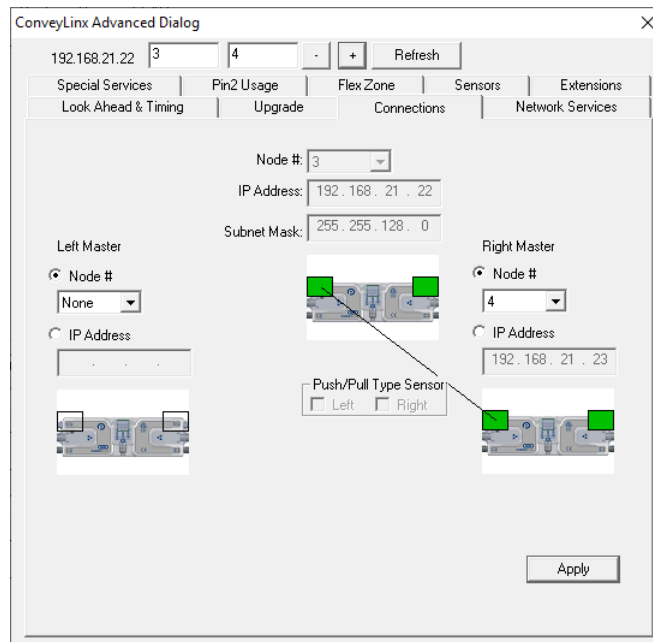
To verify that the change in Connections took place, you navigate back to *Node 2* and look at the *Connections* Tab, you can see that the downstream connection of *Node 2* is now *Node 4* instead of *Node 3*



And then to verify the connection for the other node in the pair, you can navigate to *Node 4*, you can see that its upstream connection is now *Node 2* instead of *Node 3*.



And when you navigate to *Node 3*, you can see that it is now configured as an *Extension of Node 4*



In *Figure 62*, there is an optional “Gate Down” sensor shown. This can be provided to hard-wire back to one of *Module 192.168.21.21*’s Sensor Port Pin 2 signals. Whichever Pin 2 you select to use, you need to set its function to *Accumulate (DI)* and point the usage to the Downstream zone (See section *Accumulate Intermediate Zone* on page 95). This sensor should energize Pin 2 when the gate is open to cause any *carton* that appears in the

downstream zone of 192.168.21.21 to stop and accumulate. When the gate is down, the sensor should de-energize Pin 2 in order to allow the zone to release. You can also reverse the polarity of this sensor (i.e. energized when down and de-energized when open) and invert the Pin 2 signal as described in section *Inverting the Aux I/O Pin 2 Signals* on page 99 for details.



APPENDIX E – POWER SUPPLY LOADING

The current loading on the power supply for a group of *ConveyLinx* modules depends upon the *Motor Type* selected. Each of the motor types available has an associated rated current that the motor will draw at rated torque and maximum speed. Each motor type also has an associated allowed current draw that is available for a period of time upon the initial starting of the motor. These current values and starting times are shown in the following chart:

	<i>ECO</i>	<i>ECO Plus*</i>	<i>Boost</i>	<i>Boost 8</i>
Power supply load per Motor Port at rated torque at maximum speed	2.5 A	2.5 A	3.5 A	3.5 A
Power supply load per Motor Port during motor starting period	3.0 A	4.1 A	5.0 A	8.0 A
Duration of motor starting period	5.0 sec.	No time limit	1.5 sec	3.0 sec

*ECO Plus type is only available for firmware version 4.07 and later and EasyRoll version 4.11 and later.

Please note that the current values shown are per Motor Port, so if both Motor Ports are being used on a given *Module*, the current load seen by the power supply for that module will be double the value shown.

NOTES:

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