



ConveyLinx-Ai2 User's Guide

Version 1.7 — Aug 20, 2020



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1. About This Manual

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



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 particular installation, Pulseroller 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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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

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2. Glossary of Terms

Term	Definition
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 ConveyLinx-Ai2 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
ERSC	Ethernet Roller Speed Control module – Conveyor control module that is part of the ConveyLinx family. Each ERSC can accommodate up to 2 MDR conveyor zones. In this document the term module will be synonymous with ERSC
ERSC-SE4	Designed to “break-out” the RJ11 connection for easy installation. The module has an amplifier to the output giving it up to 100mA output capabilities. Configurable diodes for the inputs to minimize leakage current to and from the ERSC. Module also allows for external power source connection for auxiliary devices.
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
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
JST	This is the name of a particular connector manufacturer that produces a specific plug/ socket arrangement for MDR connection to control cards. This name is accepted within the conveyor and MDR industry as a simple description of the particular socket style used on ERSC hardware.
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
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
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 controller to MDR
Retro-reflective / Reflex	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. ‘Reflex (or sometimes known as proximity) type photo-sensors emit light to be reflected back from an object located sufficiently close to the sensor. ‘For both types of photo-sensors, when they detect their reflected light source, their signaling output circuit changes state.
RJ-11 / RJ-12	Registered Jack Style 11 / 12 – Standard connector / receptacle format utilizing 4 or 6 pin connections. The typical standard connection for telephones. RJ-11 utilizes 4 pins and RJ-12 utilizes 6 pins but both styles use the same physical size.
RJ-45	Registered Jack Style 45 – Standard connector / receptacle format utilizing 8 pin connections. The typical standard for computer network cable connections
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
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 is allowed to enter
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 loads to queue on a conveyor in discrete zones such that loads do not touch each other

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3. Getting Started

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

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.

What do you want to do?

The Basics

[Learn about module hardware ports](#)

[Learn about power supply sizing](#)

[How to Auto-Configure your network of modules](#)

[Find out about what all the LED states mean](#)

[Learn about the different release modes and how to change them](#)

[Learn about Flex Zone](#)

[Learn about jam conditions](#)

[How to reset a module back to factory default](#)

[How to wire up a Wake Up interlock](#)

[How to wire up a Lane Full Interlock](#)

[How to Auto-Replace a module](#)

Basic things you can do with EasyRoll

[Learn about basic navigation through EasyRoll](#)

[Learn about ZPA settings and how to change them](#)

[How to change motor direction, speed, accel/decel, etc.](#)

[Learn about motor status and error indicators](#)

[How to change Jam Timers and Auto-Clear Timers](#)

[How to change how the module logic uses the block/clear output from your sensors](#)

[How to change your Aux I/O Pins to match the signals you are using](#)

Some advanced things you can do with EasyRoll

[Learn how to discover modules on your network and change IP addresses](#)

[How to set up Look Ahead Slow Down feature](#)

[How to disable Flex Zone Recognition and why you may want to](#)

[How to set up an Extension or slave module](#)

[How to connect two separate networks together to operate in ZPA](#)

[How to backup and restore module settings](#)

[How to upgrade module firmware](#)

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4. Module Hardware

Ai2 Modules are designed to be installed and integrated into the conveyor's mechanical side frame assembly. The Ai2 Module is a controller for up to 2 Motorized Drive Roller (MDR) conveyor zones. Each Ai2 Module provides connection points for 2 MDR units with their corresponding 2 photo-sensors as well as upstream and downstream network and discrete interconnections to form a complete control system for zoned MDR conveyors.

✱ The “left” and “right” naming convention for the module ports is based upon facing the front of the Ai2 Module and is not to be confused with direction of product flow on the conveyor. Product flow will be designated as “upstream” and “downstream”

Learn more:

[Identifying Ai2 Module Components](#)

[Mounting Dimensions](#)

[Motor Ports](#)

[Sensor Ports](#)

[Ethernet Ports](#)

[Power Connections](#)

[Power Supply Sizing](#)

[LED Status Indicators](#)

[Technical Specifications](#)

Last modified: Aug 18, 2020

4.1. Identifying Module Components



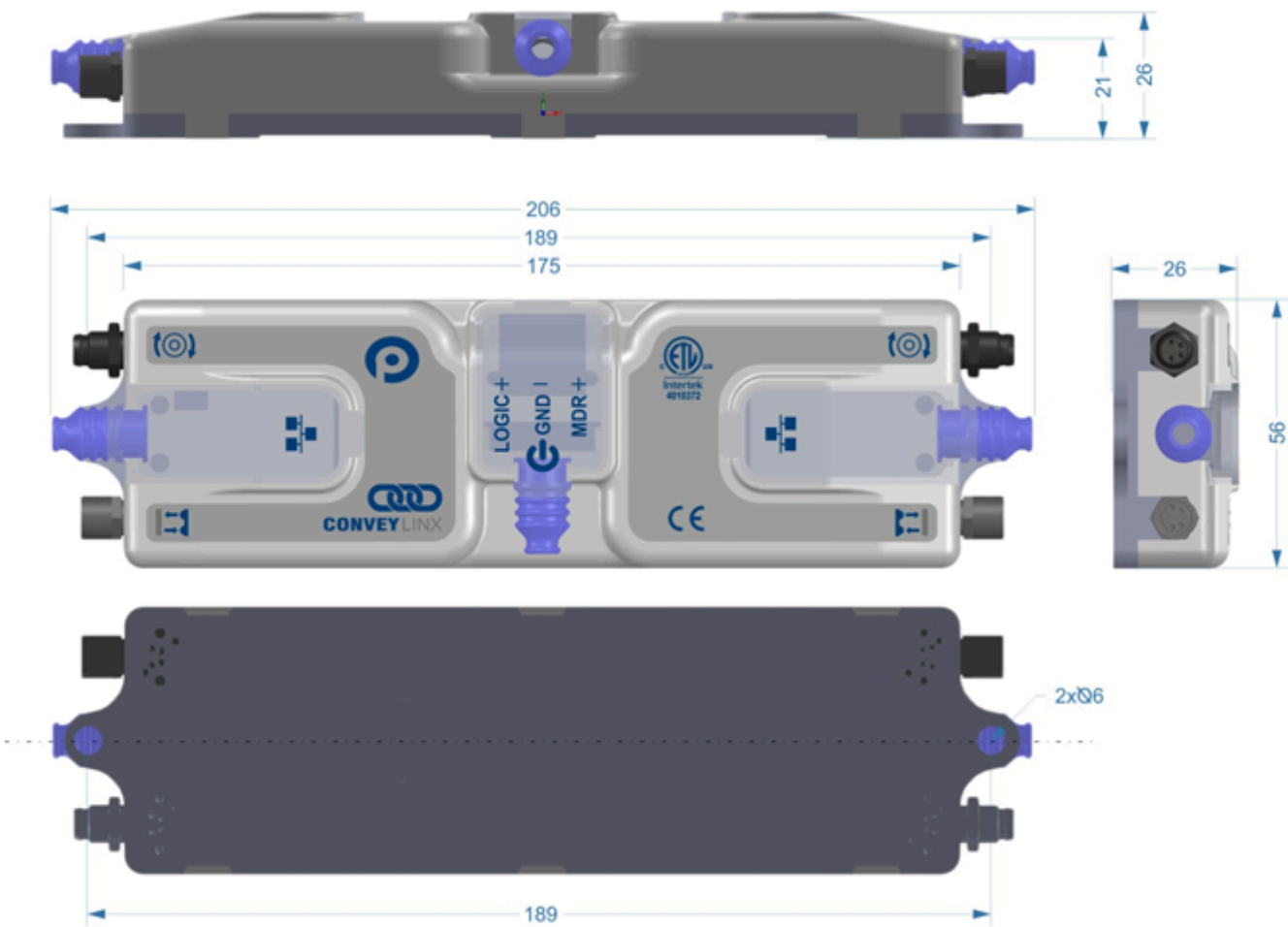
Item	Description
1	24VDC Power Terminals with separate connections for Logic and Motors
2 & 3	Motor Left LED & Motor Right LED – Motor status indicators
4 & 5	Left Sensor & Right Sensor Status LED Indicators
6	Module Status LED Indicator
7	Module Power LED Indicator
8 & 9	Motor Left and Motor Right Port – 4-pin M8 style connector for MDR connection
10 & 11	Sensor Left and Sensor Right Port – 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

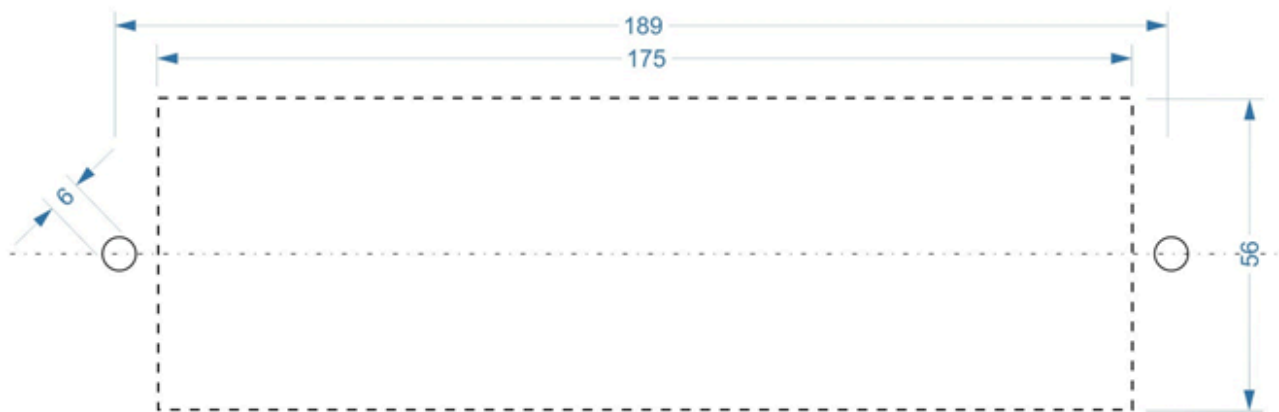
- Indicates items shipped unattached to the module but are included in the module's box

Last modified: Jul 21, 2020

4.2. Mounting Dimensions



Mounting Hole Dimensions



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4.3. Motor Ports

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

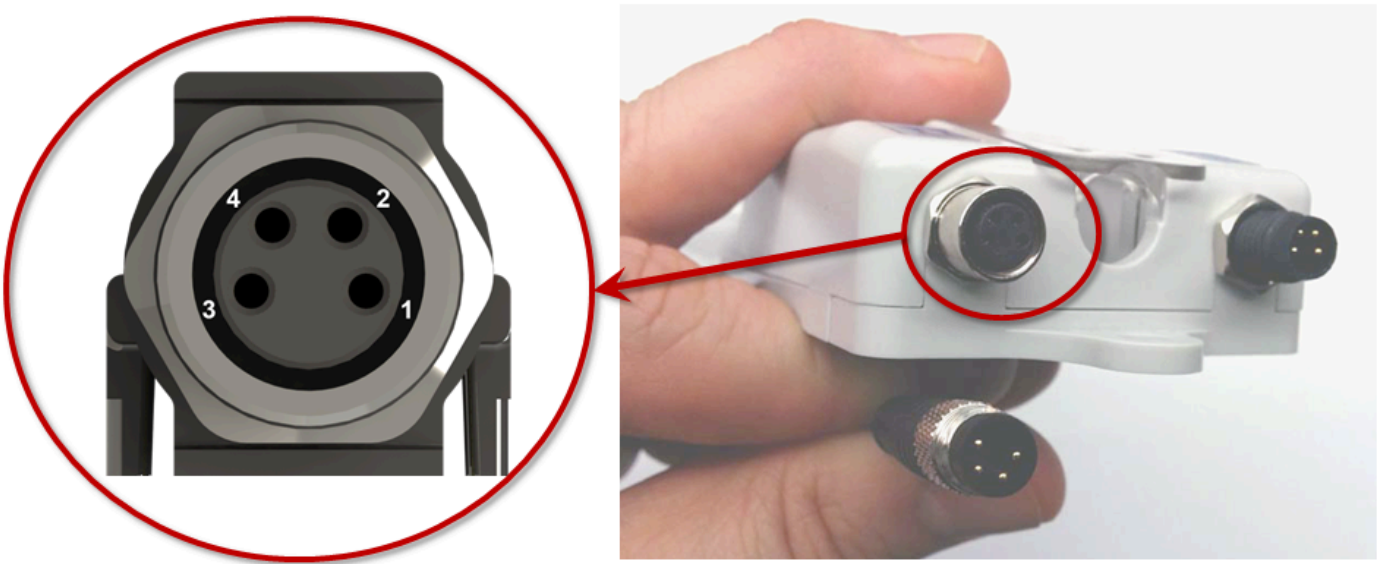


M8 4 Pin Male Motor Port with Senergy Ai Motor Female Connector

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4.4. Sensor Ports

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



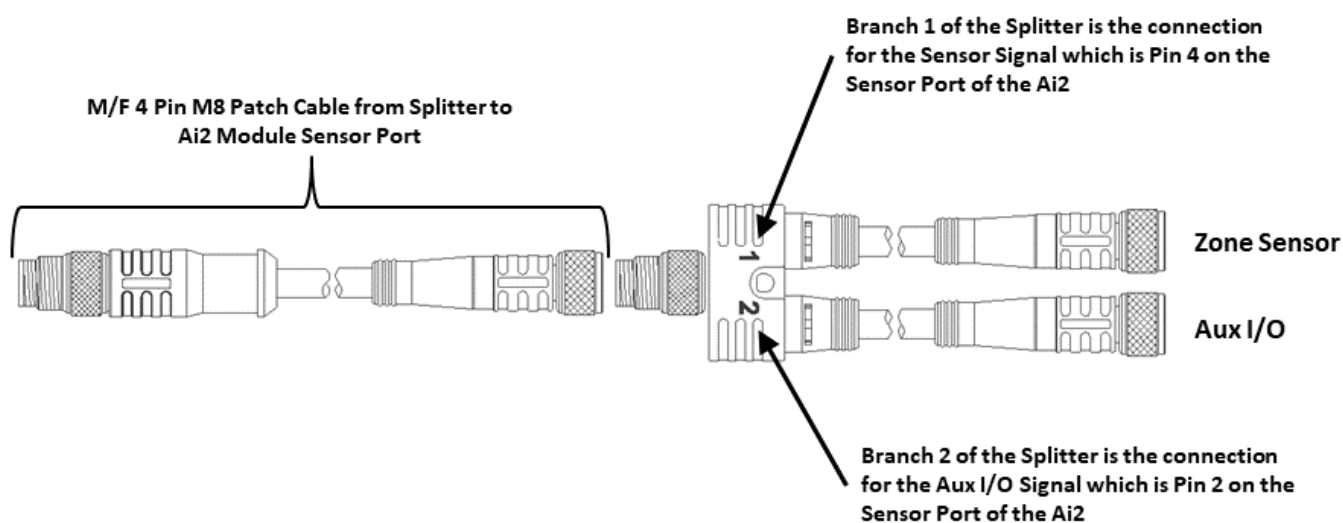
Pin	Signal	Description
1	24VDC	Module's 24VDC Supply
2	Aux I/O	I/O Signal – Input or Output Function configured with EasyRoll software
3	GND	Module's DC Common
4	Sensor Signal	Logical Input for Sensor's state output – Auto detect for NPN or PNP

Last modified: Aug 05, 2020

4.4.1. 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

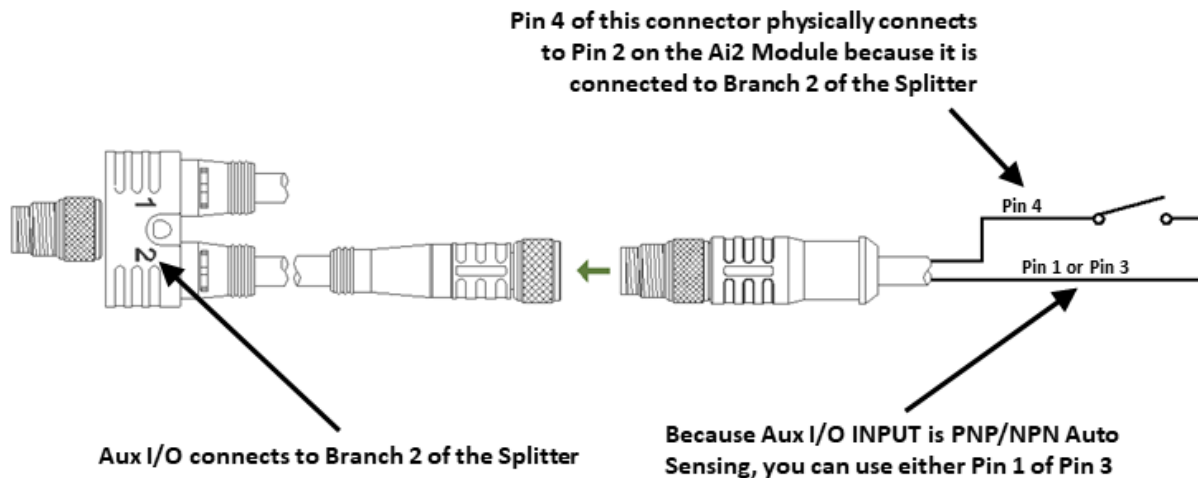
* Splitter cables are commercially available from multiple sources. [Click here for information for Pulseroller IOX-2 Breakout/Splitter Module](#)



Typical Parallel Splitter Cable Usage

Aux I/O Pin 2 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.



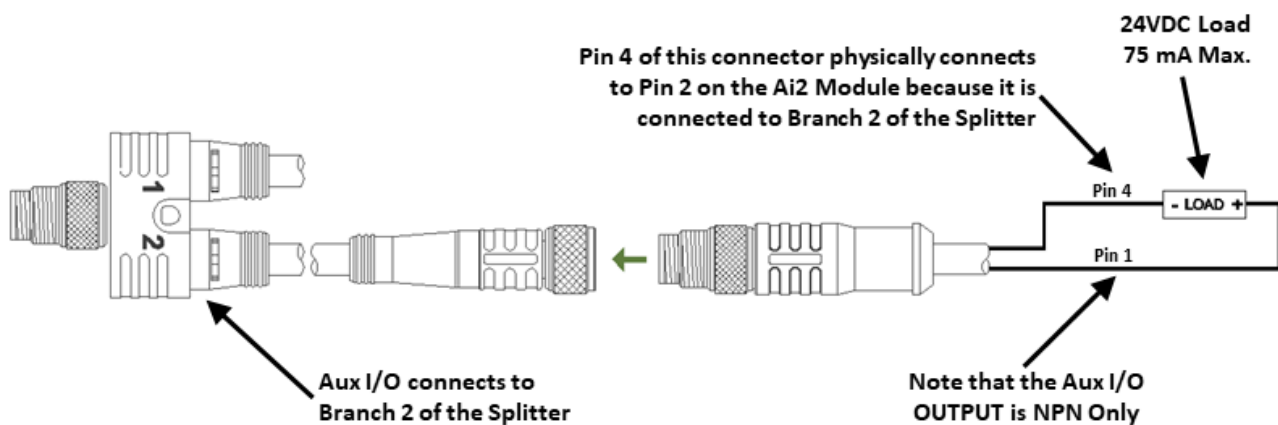
Aux I/O Pin 2 Input Connection Diagram



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)

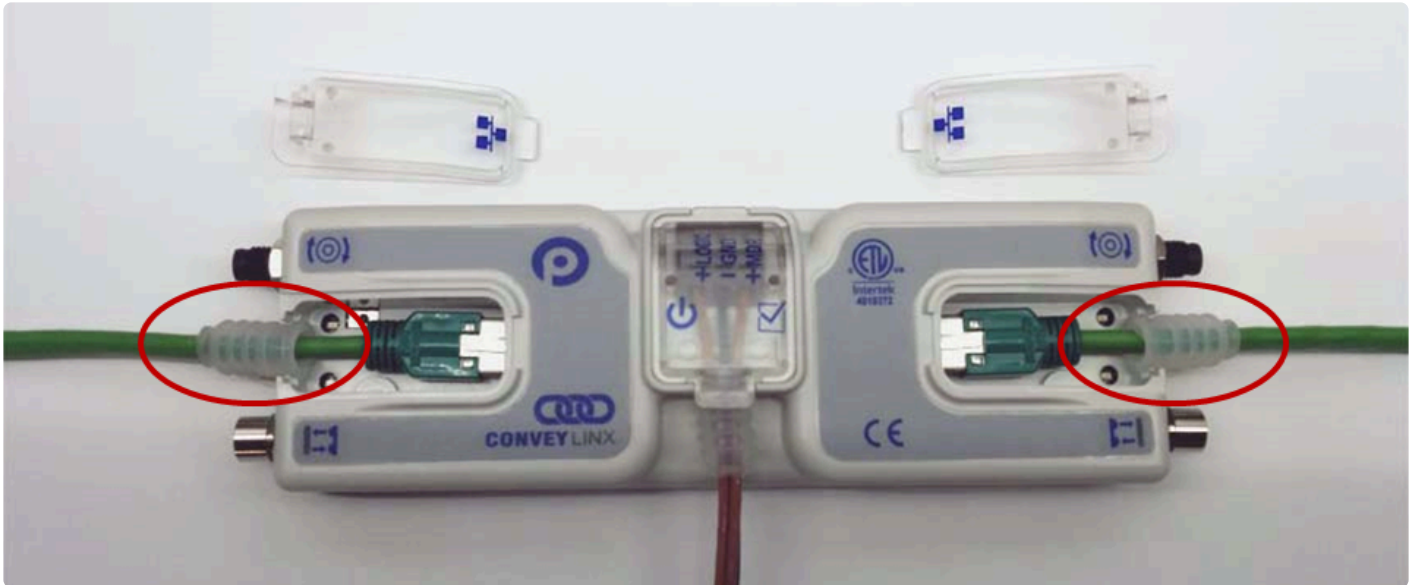


Aux I/O Pin 2 Output Connection Diagram

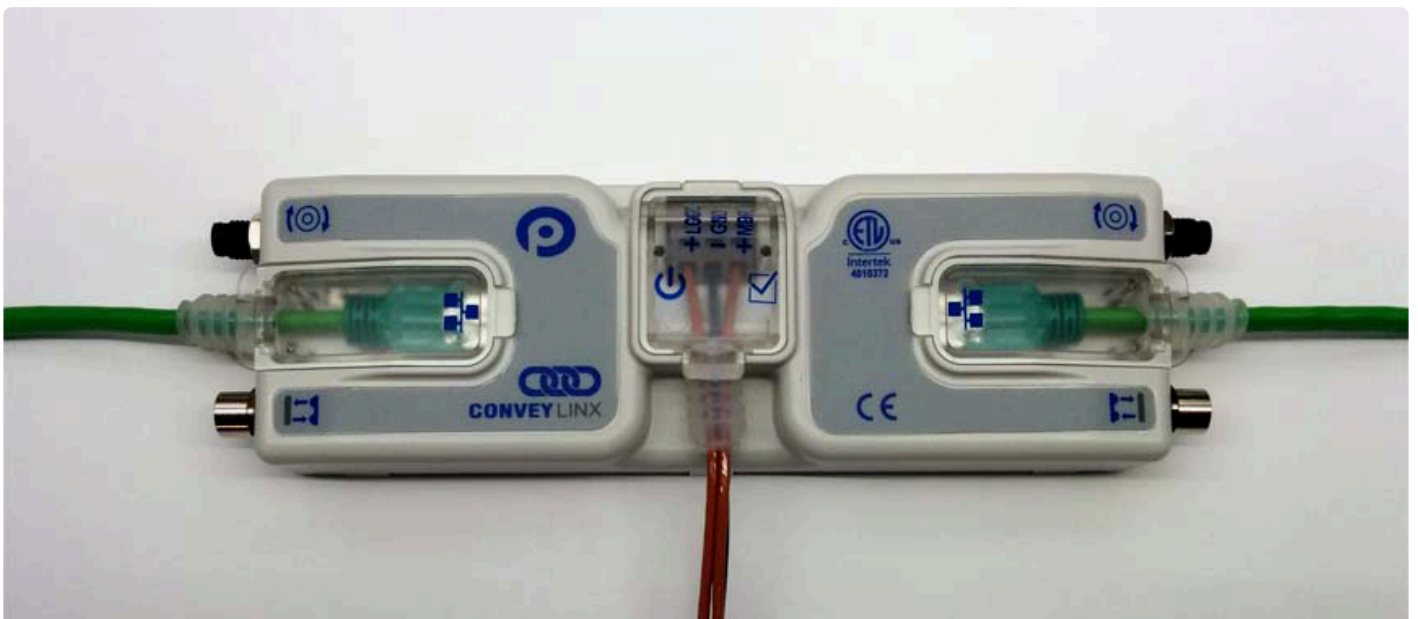
Last modified: Aug 18, 2020

4.5. Ethernet 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. Shown below are the Ethernet cables installed using shrouds to protect the RJ-45 connectors on the Ethernet cables. Each module is shipped with 3 shrouds – 2 for the Ethernet Cables and 1 for the power wiring.



Ai2 Module with Left & Right Ethernet Cable (Covers removed)



Ai2 Module with Left & Right Ethernet Cable with Covers attached

How to install shrouds on Ethernet cables

Assembly Tool

Phoenix Contact Part Number 2891547 FL IP 54



* Tool must be purchased separately

Putting the shroud on the cable

1: With tool closed, place shroud on the pins



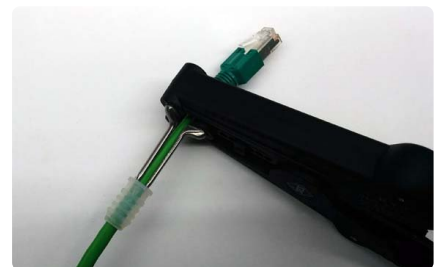
2: Grip the handle to open the pins to stretch open the shroud



3: While continuing to grip the handle, insert the RJ-45 cable through the shroud opening as shown



4: Release the handle and the pins close allowing them to be removed from the shroud

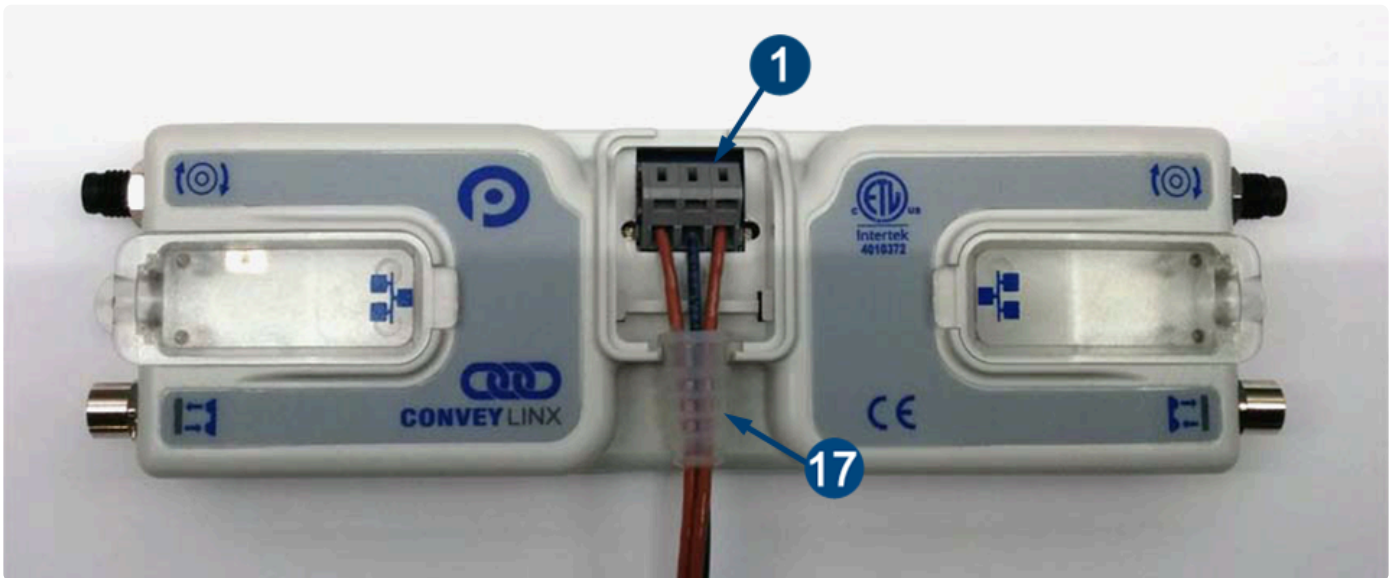


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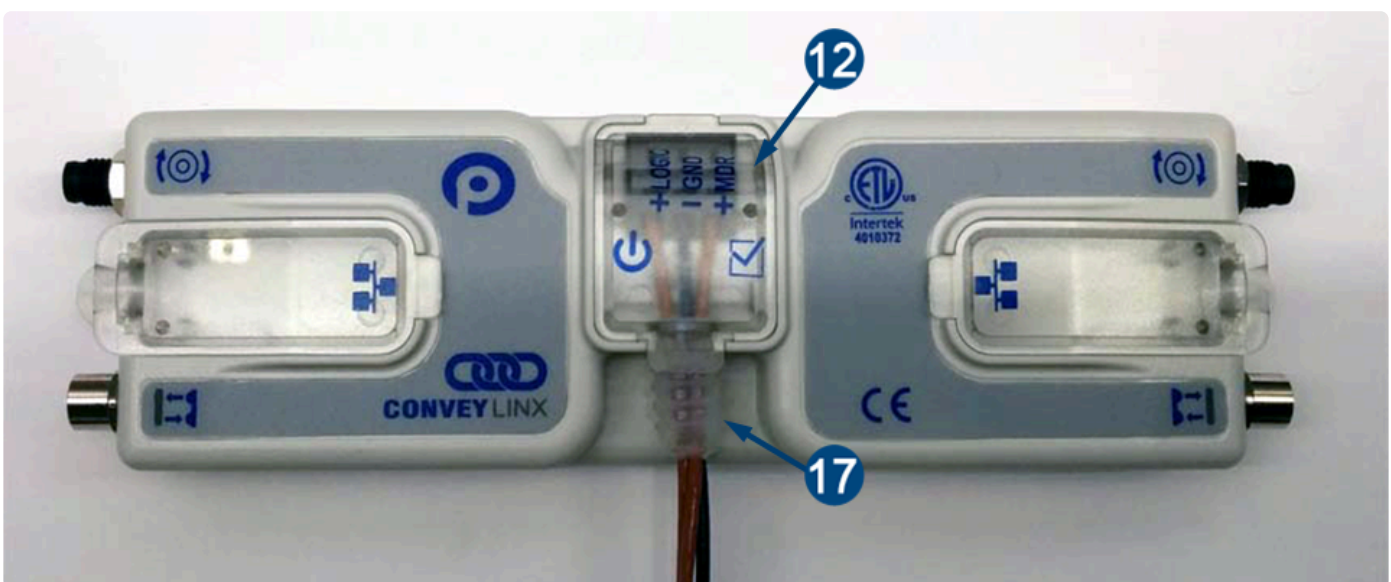
4.6. Power Connections

IP54 Power Wiring Connection

The protective shrouds (Item 17 as depicted in [Identifying Module Components](#)) will be unattached to the module when shipped and are included in the module's shipping box. These shrouds are used to maintain an IP54 installation of the power and Ethernet wiring.



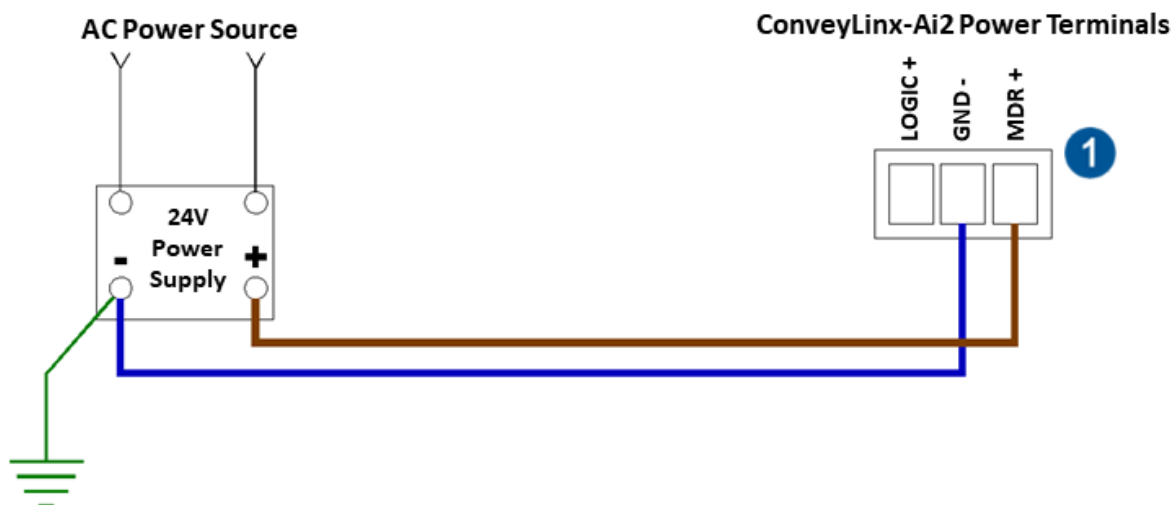
Power wires are fed through the protective shroud (Item 17). The wire terminals (Item 1) are standard cage-clamp style



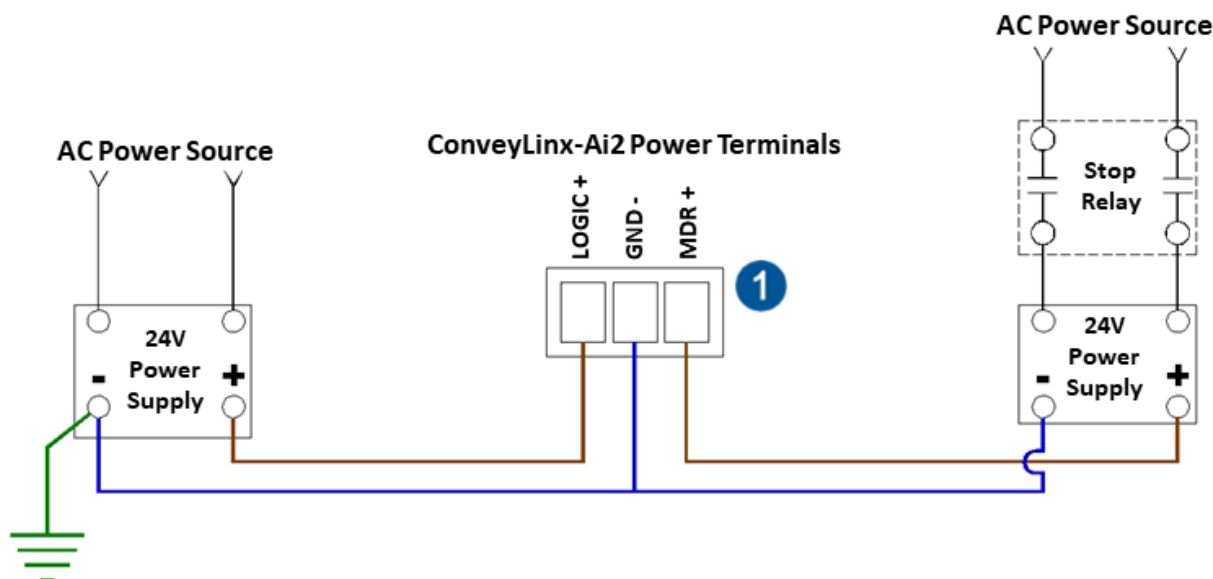
Once wiring has been completed the power wiring compartment is then sealed by snapping into place the Power Compartment Cover (Item 12)

Logic & MDR Power

The Ai2 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). If you use a single power supply, you only have to connect to the MDR+ power terminal and that will supply power to both the Logic and MDR.



Connection for a single power supply that powers both the logic and motors on the module

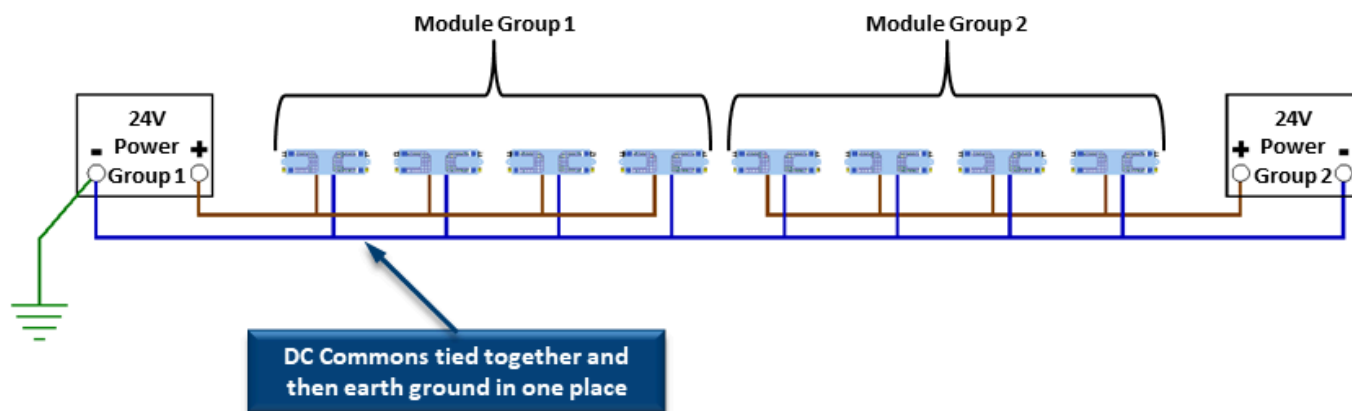


Connection for a dual power supply system where the MDR power can be switched off but a separate

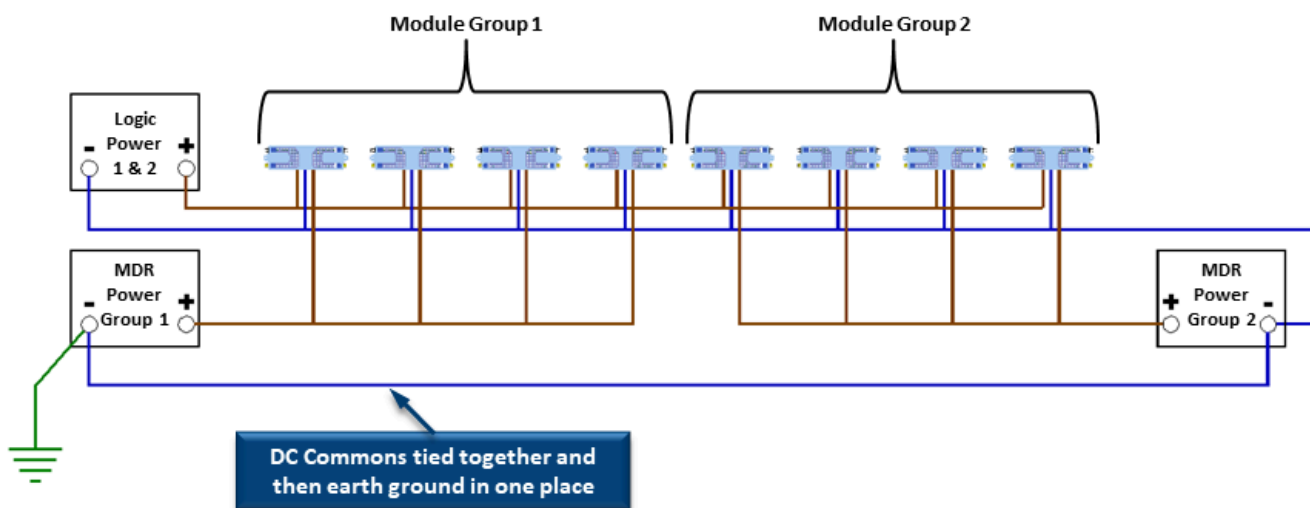
logic only power supply remains on

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.



Separate groups of module each powered by single power supplies that are supplying both logic and motor power. Each supply has its DC commons tied together and connection to ground from a single point



Separate groups of modules each with their respective MDR power from separate supplies with a single common supply for each group's logic power. Each supply has its DC commons tied together and connection to ground from a single point

Last modified: Aug 18, 2020

4.7. Power Supply Sizing

The current loading on the power supply for a group of Ai2 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:

	ECO	BOOST	BOOST ₈
Power supply load per Motor Port at rated torque at maximum speed	2.5 A	3.5 A	3.5 A
Power supply load per Motor Port during motor starting period	3.0 A	5.0 A	8.0 A
Duration of motor starting period	5.0 sec	1.5 sec	3.0 sec

* Please note that the current values shown are per Motor Port, so if both Motor Ports are being used on a given Ai2 Module, the current load seen by the power supply for that module will be double the value shown.

* The current values are at rated speed and at rated torque. The current will be less if rated torque is not required by the motor.

! Pulseroller 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. Pulseroller 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

Last modified: Jul 23, 2020

4.8. LED Status Indicators

Ai2 Module status is indicated by several LED's. All LED's with the exception of the Ethernet Link and Activity LEDs are multi-colored and context sensitive. The following sections indicate the various meanings of all LED indicators.

✱ By definition **Blinking** is approximately 1/2 second on/off cycle and **Flashing** is approximately 1/4 second on/off cycle.

[If you need help finding where LED Items are located on the Ai2 Module](#)

Communications

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

Motors

Indicator	Item	LED State	Description
Motor Left & Motor Right	2 & 3	OFF	Motor is not running and no faults detected
		Solid Green	Motor is running
		Solid Red	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
		Blinking Red	Motor is overloaded and the module is limiting current to reduce temperature
		Flashing Red	Motor short circuit detected between at least two of the phase windings or Motor Power supply is less than 10V
		Solid Amber	Module is booting up
		Slow Blinking Red	Profinet enabled discover function initiated from PLC

Network & Module Status

Indicator	Item	LED State	Description
Module Status	8	Blinking Red	Module is starting task processes
		Blinking Green	Module is ready
		Flashing Green & Blinking Red	Module is in Failsafe Mode
		Flashing Red	Auto-Configuration is in progress
		Blinking Amber	Connection to peer lost or performing firmware upgrade check
		Solid Amber	Firmware upgrade in progress

Sensors

Indicator	Item	LED State	Description
Sensors Left & Right	4 & 5	Solid Green	Sensor Input is energized
		Solid Amber	Module is booting up
		Flashing Green	When in ZPA Mode and when Sensor is blocked – indicates external device (PLC/PC controller or EasyRoll) has accumulated the zone and inhibiting release
		Solid Red	Aux I/O Pin 2 is energized (when configured as an Input)
		Blinking Red	Arrival Jam or missing sensor
		Blinking Green/Amber	Sensor Jam
		Flashing Red	network Stop condition
		Flashing Amber	Power supply is less than 10V
		Slow Blinking Red	Profinet enabled discover function initiated from PLC

Power

Indicator	Item	LED State	Description
Power	7	Solid Blue	Power supply for both Logic and Motors are connected
		Blinking Blue	Motor power supply is less than 18V

Special Cases

Indicator	Item	LED State	Description
All Sensor & Motor	2 & 3 4 & 5	Flashing Red	Module in stopped state
Left Sensor & Left Motor	2 & 4	Flashing Green	ZPA zone on Left side of module is in Maintenance Mode*
Right Sensor & Right Motor	3 & 5	Flashing Green	ZPA zone on Right side of module is in Maintenance Mode*



*Maintenance mode only accessible via remote PLC.

Last modified: Aug 18, 2020

4.9. Technical Specifications

Power Connector

Power connector is Degson DG245-5.0

Electrical Ratings

Power supply voltage	24.0V +/- 10%
Standby current consumption	< 120mA
Motor Starting Current	≤ 8A
Motor Rated Current	≤ 3A

Maximum Ratings



Operating outside these parameters may result in permanent Ai2 Module failure or unexpected device behavior

Minimum Operating Voltage	21
Maximum Operating Voltage	30V
Storage temperature	-25°C to 70° C (-13°F to 160°F)
Ambient Operating temperature	0°C to 40°C (32°F to 104°F)
Humidity	5% to 95% non-condensing
Vibration	0.152 mm (0.006 in.) displacement, 1G peak
Mechanical Shock	20G peak for 10ms duration (1.0 ms)
Enclosure IP Rating	IP54
Maximum peak current	21.5A*
Maximum motor start current	8A

*This is the maximum current that will be allowed by the hardware over current protection circuitry. On board firmware limits the amount of current based on the quantity and motor types connected

Certifications & Standards

BDS EN 61131-2:2008	Programmable controllers — Part 2: Equipment requirements and tests
BDS EN 61000-6-2:2006	Electromagnetic compatibility (EMC) — Part 6-2: Generic standards – Immunity for industrial environments
BDS EN 61000-6-4:2007+A1:2011	Electromagnetic compatibility (EMC) — Part 6-4: Generic standards – Emission standard for industrial environments
BDS EN 55016-2-1:2009+A1:2011	Specification for radio disturbance and immunity measuring apparatus and methods Part 2-1 Methods of measurement of disturbances and immunity. Conducted disturbance measurements
BDS EN 55014-1:2007+A1:2009 +A2:2011	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus — Part 1: Emission
BDS EN 61000-4-2:2009	Electromagnetic compatibility (EMC) Part 4-2: Electromagnetic discharge Immunity test
BDS EN 61000-4-4:2012	Electromagnetic compatibility (EMC) Part 4-4 Electrical fast transient/burst immunity test.
BDS EN 61000-4-5:2007	Electromagnetic compatibility (EMC) Part 4-5 Surge immunity test.
BDS EN 61000-4-6:2009	Electromagnetic compatibility (EMC) Part 4-6 Immunity to conducted disturbances, induced by radio-frequency field
BDS EN 61000-4-11:2009	Electromagnetic compatibility (EMC) Part 4-11 Voltage dips, short interruptions and voltage variations immunity tests

Sensor Port I/O

Each Module is equipped with two 4-pin female M8 style Sensor I/O ports primarily used to connect a photo-electric sensor to the module. Each of these ports has one pin dedicated as an input for the sensor (pin 4) and one Aux I/O pin (pin 2) that is configurable to be either an input or an output.



- Pin 1 – 24VDC
- Pin 2 – Configurable Aux I/O Pin
- Pin 3 – GND
- Pin 4 – Input

Sensor Input Signal (M8 Pin 4)

The sensor input (pin 4) is auto-sensing for PNP or NPN circuit type such that both sourcing and sinking current will activate the input based upon the following conditions:

Minimum ON Current	1.5 mA
Maximum OFF Current	0.4 mA

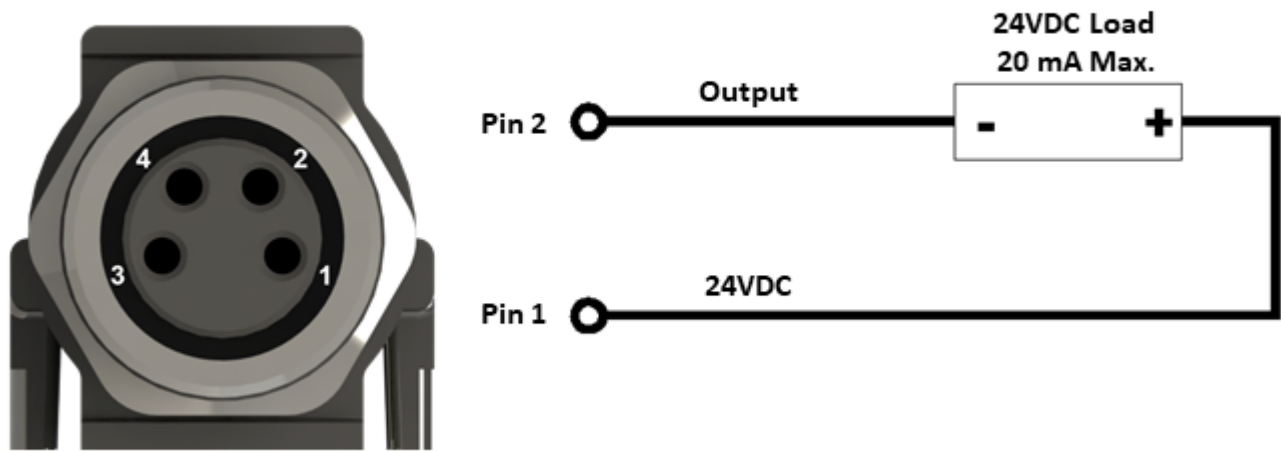
Aux I/O Signal (Pin 2) when configured as as INPUT

When configured as an INPUT, the Aux I/O (pin 2) is auto-sensing for PNP or NPN circuit type such that both sourcing and sinking current will activate the input based upon the following conditions:

Minimum ON Current	1.5 mA
Maximum OFF Current	0.4 mA

Aux I/O Signal (Pin 2) when configured as an OUTPUT

When configured as an OUTPUT, the Aux I/O (Pin 2) provides an NPN only circuit as illustrated:



Sensor Port 24VDC (Pin 1) and GND (Pin 3)

Pin 1 of each Sensor Port provides 24V for powering up a sensor device and/or for supplying the load for the Aux I/O (Pin 2) when configured as an output. The available current for the two control ports on the module is limited internally by a solid-state fuse. The maximum combined current consumption for the two sensor ports is 100 mA.

! Current in excess of 100mA drawn from the sensor port's 24V pin may cause permanent damage to the sensor detection circuit. Care should be taken to avoid excess loads, short circuits and miss-wiring of the sensor port.

Motor Port

Supported motor types	Senergy Ai
PWM frequency*	25 kHz +/- 0.1%
Maximum starting current	8A
Maximum rated current	3A
Motor Protection**	Coil-to-coil short, coil-to-Vcc short, overheating, over-voltage, under-voltage, stall sensing and protection

- The PWM frequency is firmware version dependent

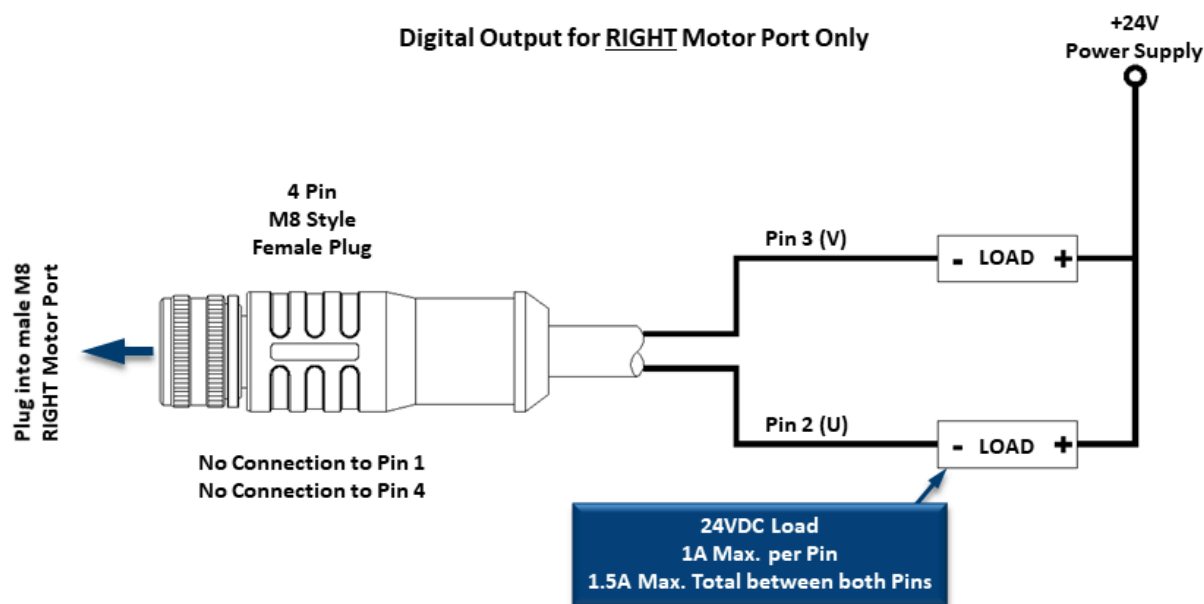
! **During normal operation as an MDR port, the internal protection circuitry is not capable of detecting a short-circuit between a BLDC coil output and ground. Such a short-circuit will

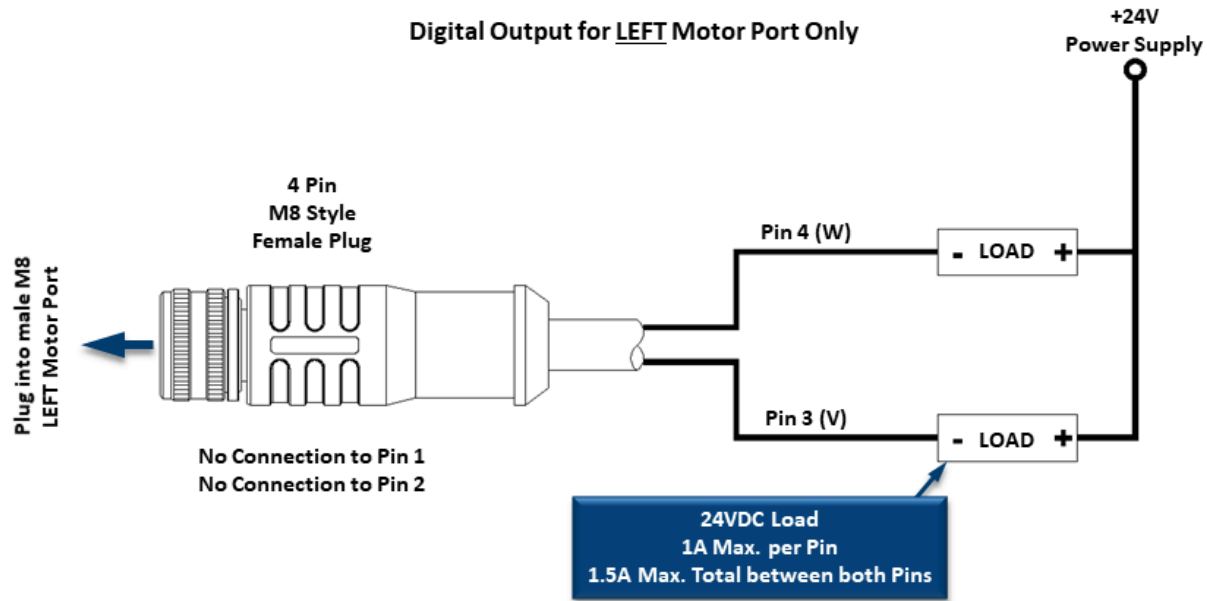
cause damage to the high-side bridge transistors. When operating these outputs as general purpose outputs, the high-side transistors are disabled, so a pin-to-ground short-circuit is not an issue

Motor Ports in Digital Output Mode

Either the Left or Right (or both) Motor Ports can be configured to operate their respective motor coil output transistors as 24V DC digital output signals. These digital output signals are sinking type only and will accommodate up to 1A on a given output pin, but restricted to a total of 1.5A for both pins on a given port.

For each of the Motor Ports, only 2 out of the 3 total motor coil output pins are available as digital outputs for a total of 4 Motor Port digital outputs available per module. Please note that these 2 available motor coil pins are **different between the Left and Right Motor Ports** as illustrated:





Ethernet

- 3 port integrated switch (2 external ports and 1 port for the on-board processor)
- Automatic speed setup (10Base-T / 100Base-TX)
- Automatic duplex configuration (Full / Half)
- Automatic straight/crossover cable detection (Auto MDI/MDI-X)
- PAUSE frame support
- Back pressure flow control support
- Maximum segment length: 100m / 328ft

Supported Protocols

- Modbus/TCP
- EtherNet/IP
- Profinet IO

Last modified: Aug 18, 2020

5. Auto-Configuration

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 Procedure** requires the use of **EasyRoll** on a PC.

[Connecting Devices to Ai2 Module](#)

[Connecting Nodes Together](#)

[Installing EasyRoll](#)

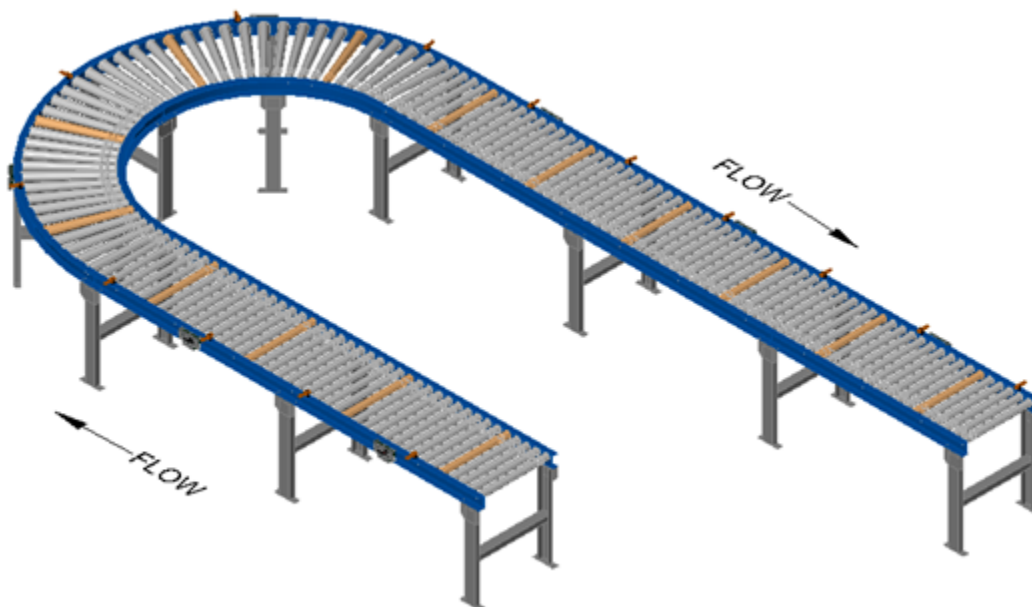
[ConveyLinx Ethernet Definition](#)

[Connecting Your PC to Network](#)

[Auto-Configuration Procedure](#)

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. A networked ConveyLinx solution can control more complex conveyor paths that include diverting and merging equipment by utilizing external PLC/PC control and/or on-board ConveyLogix programming.



Example of a Linear Conveyor

Last modified: Aug 18, 2020

5.1. Device Connections to Modules

Before the **Auto-Configuration Procedure** can be performed; each individual Ai2 Module needs to have its associated MDR's and photo-sensors connected in the proper way for expected operational results.

In general, each Ai2 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 Ai2 Modules mounted on the conveyor. Modules will determine how to operate based upon how the photo-sensors and MDR's are connected.

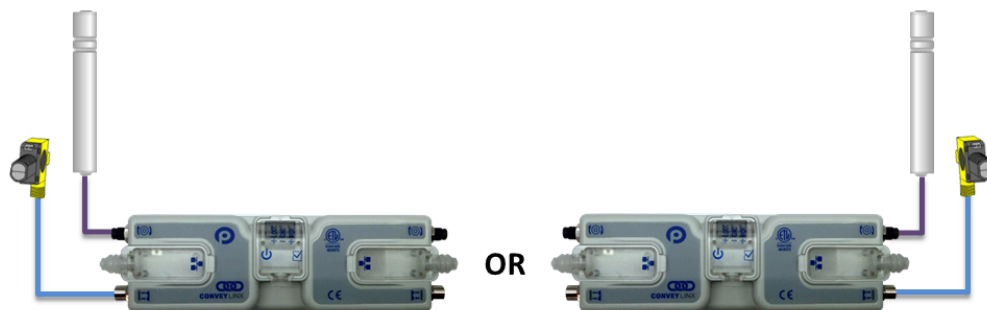
- * The number of **Sensors** connected will determine the total number of **Zones**. Once **Auto-Configuration** is complete, this number of **Zones** cannot be modified or over-ridden without performing another **Auto-Configuration Procedure**.

A single Ai2 Module can operate as a:

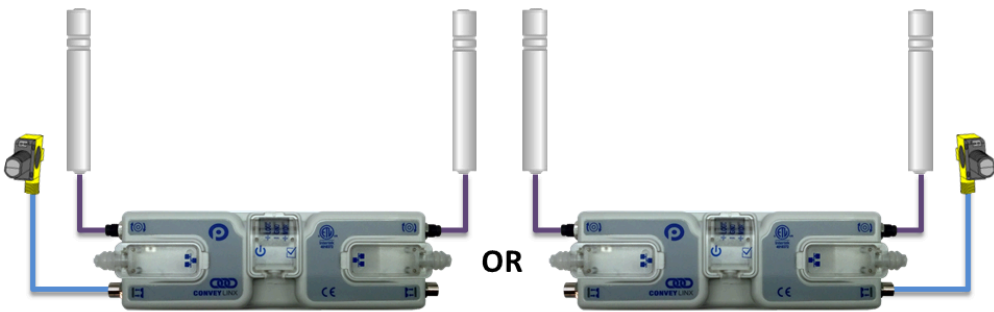
2 zone controller
with 2 MDR's and 2
photo-sensors



1 zone controller
with 1 MDR and 1
photo-sensor on
Left or Right Side



**1 zone controller
with 2 MDR's and 1
photo-sensor with
Sensor on Left or
Right Side**



Last modified: Aug 18, 2020

5.1.1. Examples that will generate errors

* These examples are not necessarily invalid and will not cause the Auto Configuration procedure to fail or abort, but they will result in module errors in ZPA Mode.

This module will configure as a two zone module but will generate a motor connection error for the missing motor on the Right side



This module will configure as a two zone module but will generate a motor connection error for the missing motor on the Left side



This module will configure as a single zone module on the Right side but will generate a motor connection error for the missing motor on the Right Side



This module will configure as a single zone module on the Left side but will generate a motor connection error for the missing motor on the Left Side



Last modified: Jul 22, 2020

5.2. Motor Rotation Definition

The Ai2 Module uses a **Clock-Wise (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.



Motor Rotation Definition

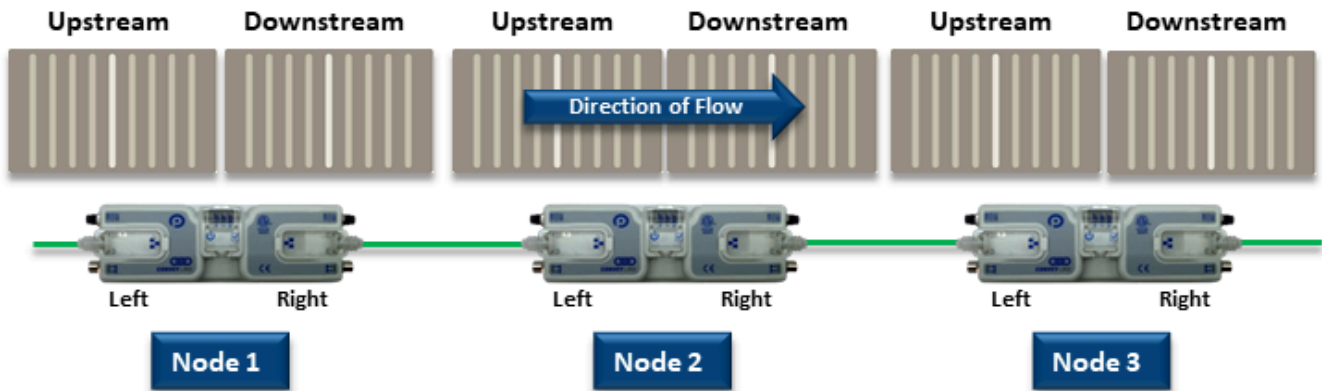
- * ***Auto Configuration Procedure*** will automatically adjust the motor rotation direction based upon the flow established by the procedure as long as the cable end of the roller is on the same side of the conveyor as the Ai2 Module. If the rotation direction is not correct after the ***Auto-Configuration Procedure***, you can change it in ***EasyRoll***. [How to change the motor rotation direction](#)

Last modified: Aug 18, 2020

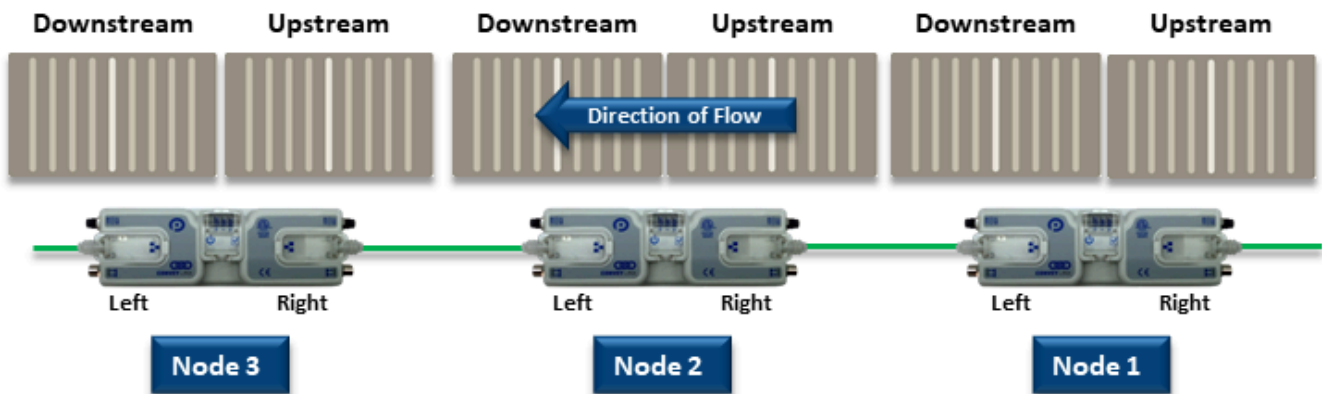
5.3. Node Connections for a Subnet

With your motors and sensor connected to your individual Ai2 Modules, you will need to connect the Ethernet network cabling from module to module in a daisy chain fashion. The most upstream module in the direction of flow is node 1.

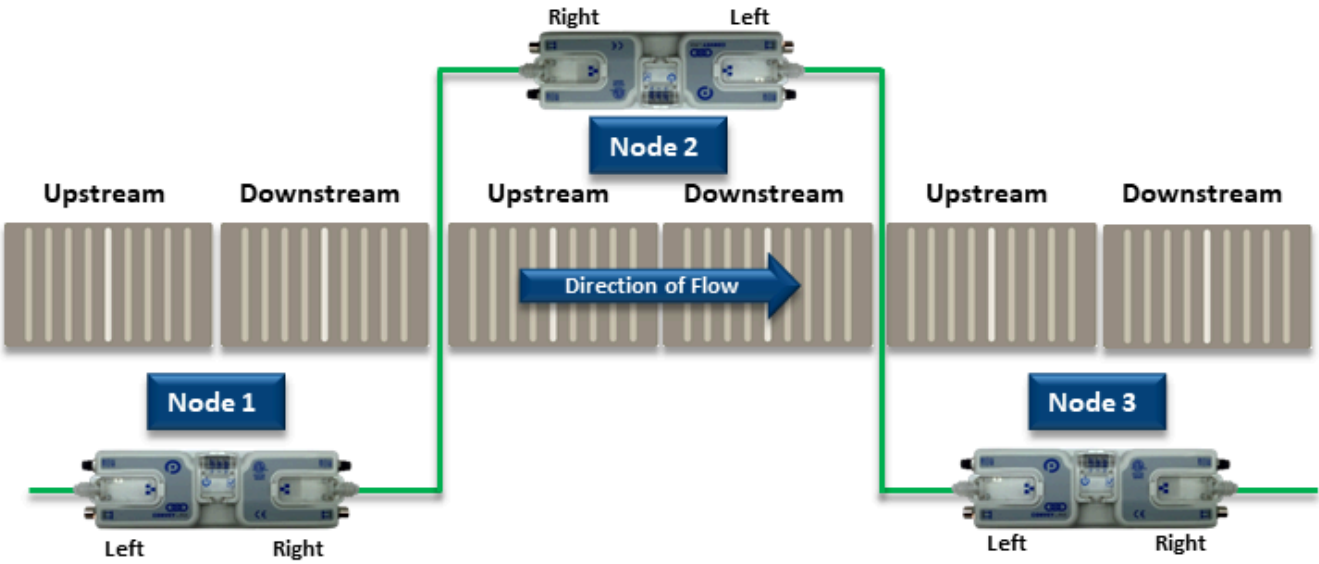
* Please note that the **Flow** is based upon the Ethernet cable routing during the **Auto-Configure Procedure**. The **Flow** direction cannot be changed or over-ridden. The only way to change the **Flow** direction is to perform another **Auto-Configuration Procedure**



Subnet with Left to Right Flow



Subnet with Right to Left Flow



Subnet showing one module on the opposite side of conveyor

Last modified: Aug 18, 2020

5.4. Installing EasyRoll

The files for **EasyRoll** can be download for free at **www.pulseroller.com** and will be typically 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\"



Please note that some anti-virus and/or security updates block the usage of WinPcap utility which is used by EasyRoll. It is recommended that when you run "Setup.exe" that you "Run as Administrator"

Last modified: Jul 23, 2020

5.5. ConveyLinx Ethernet Definition

All Ai2 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**.

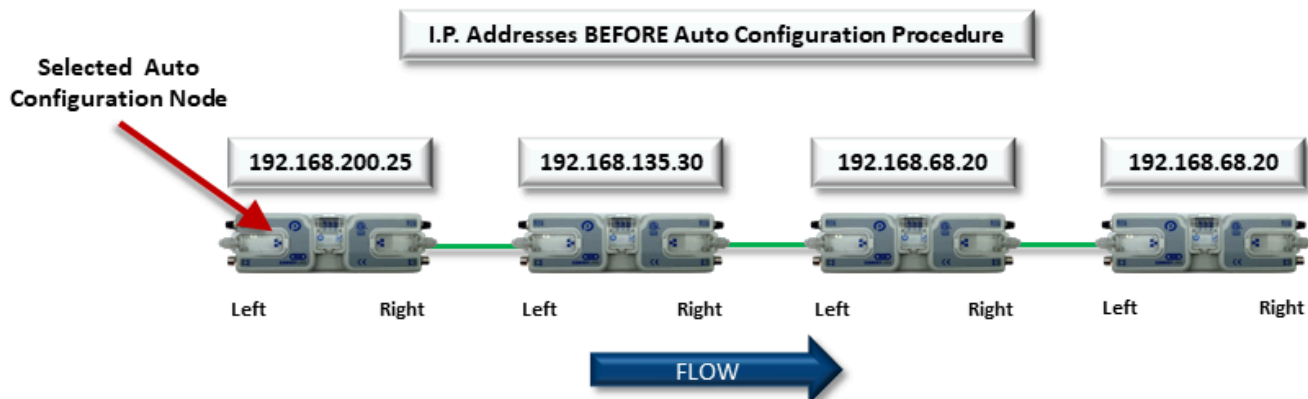
For example; if a module has an I.P. address of “192.168.25.20” then its **Subnet** address is “192.168.25” and its **Node** is 1 (i.e. $20 - 19 = 1$)

At the factory, each and every module is assigned an 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.

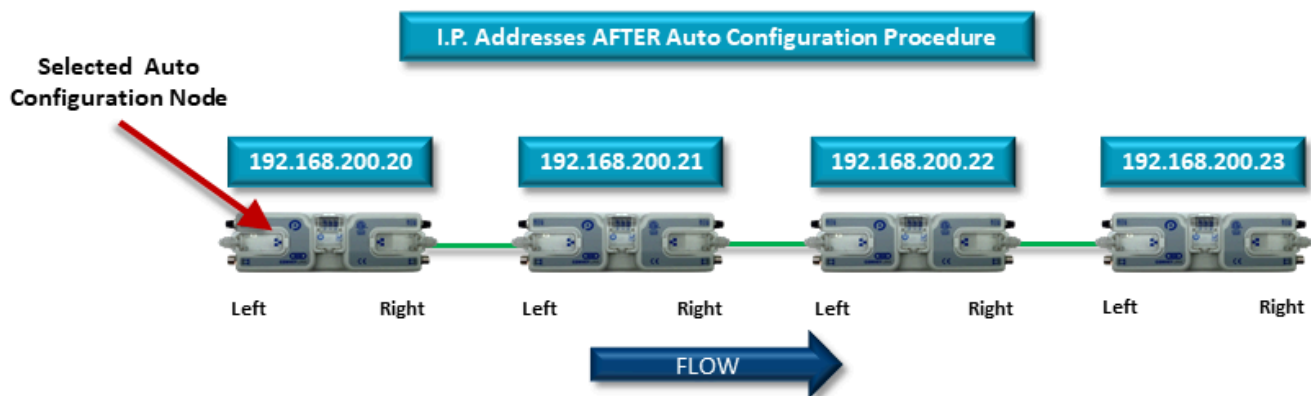
When the [Auto Configuration Procedure](#) is initiated; one of the many things that occur is that each module is automatically assigned a new I.P. address. This I.P. address for all modules is determined by the **Subnet** of the I.P. address already stored inside the most upstream module. Even if all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

An Example

Here is a 4-module network with possible I.P. addresses that could have been on the module from the factory. Note that their **Subnets** could be different as well as there could be duplicate addresses.



Once the **Most Upstream Module** is identified as the **Selected Auto-Configuration Node** and when the **Auto-Configuration Procedure** is performed; all 4 modules will have their I.P. address configured as shown.

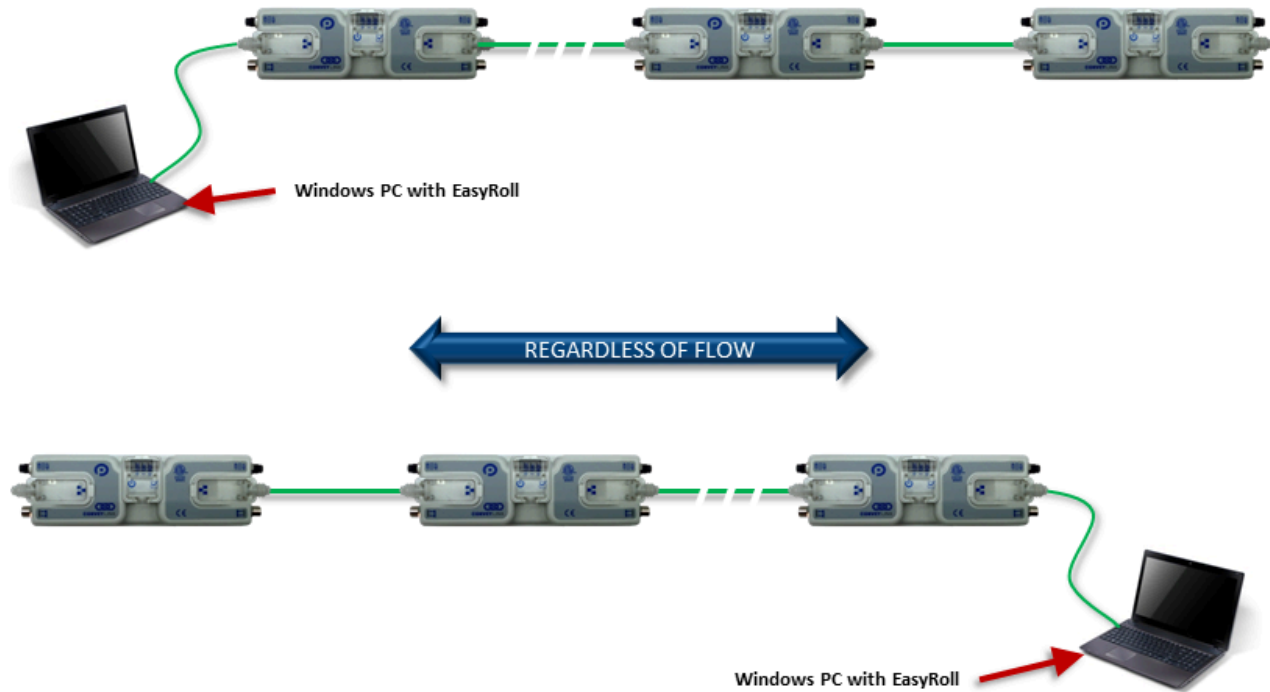


- * The Auto-Configuration Procedure will assign Nodes up to and including Node 240. Therefore, each Subnet is limited to **221 Nodes**

Last modified: Aug 18, 2020

5.6. Connecting Your PC to the Network

You can connect your PC to a ConveyLinx network with a standard RJ-45 Ethernet cable at either end of the string of modules.



! 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

Last modified: Aug 18, 2020

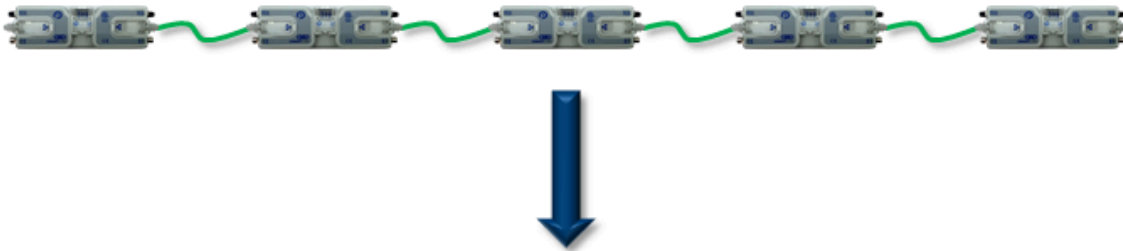
5.7. Auto-Configuration Procedure

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.

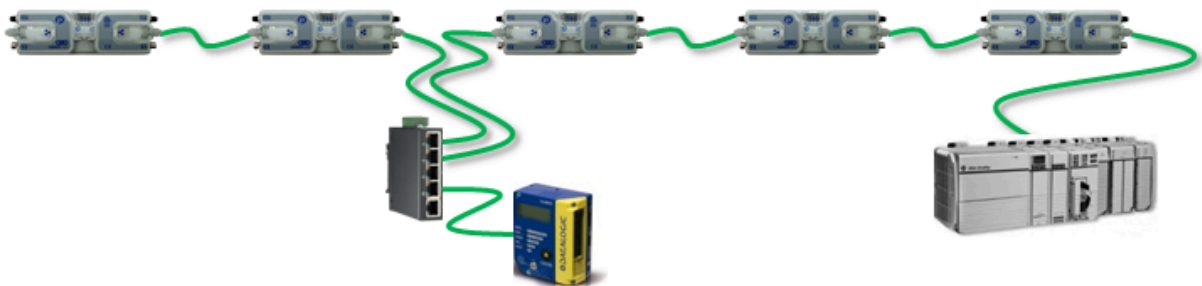
Before You Begin

- All sensors should be clear. **Auto-Configuration** assumes that state of the sensor is the “zone empty” state
- Make sure you have no more than 221 Ai2 Modules connected. **Auto-Configuration** will not configure past 221 Ai2 Modules in one network
- Make sure that there are no other Ethernet devices or switches connected in your string of Ai2 Modules. After **Auto-Configuration** is complete and successful, you can interrupt the Ethernet string with other devices and/or switches

For Auto-Configuration – make sure all modules are connected without any other devices



Once Auto-Configuration is complete – you can insert Switches and connect devices as needed



The direction of flow of the conveyor dictates where to begin the **Auto-Configuration Procedure**. The Ai2 Module located at the most upstream or in-feed end of the conveyor is the module where the procedure must be initiated.. Because of its physical location on the conveyor path and physical location in the Ethernet connection chain; the most upstream Ai2 Module will automatically connect to all downstream Ai2 Modules and set their I.P. address for communication. Then the routine automatically sets the direction of flow.

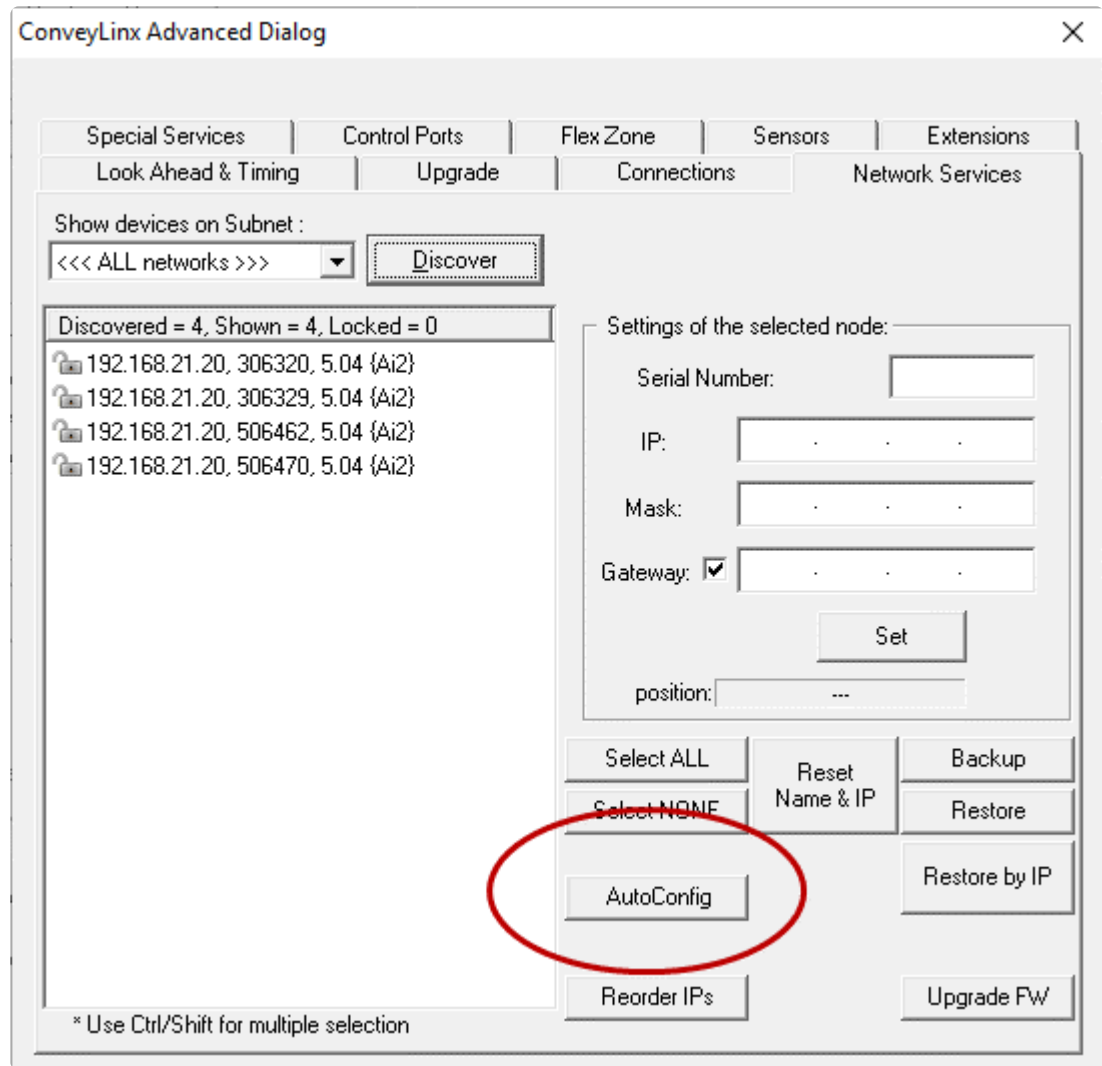
! For the Auto-Configuration to work properly, all loads, totes, product, containers, cartons, etc. must be removed from the entire conveyor path and all photo-sensors must be aligned and adjusted so that none are detecting that their respective zone is occupied. Failure to meet these conditions will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

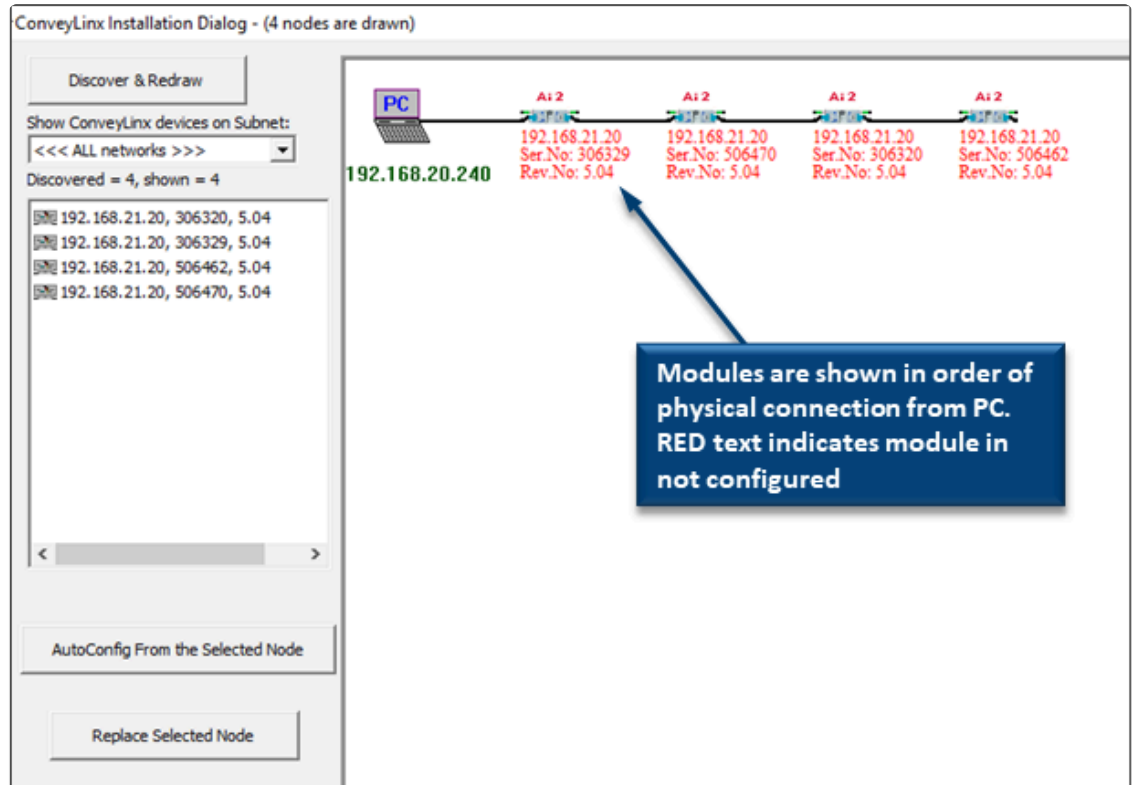
Auto-Configuration Procedure

Start EasyRoll V4.04 or higher and invoke the *Advanced Dialog*. In the pop-up panel select *Network Services* and click *Discover*

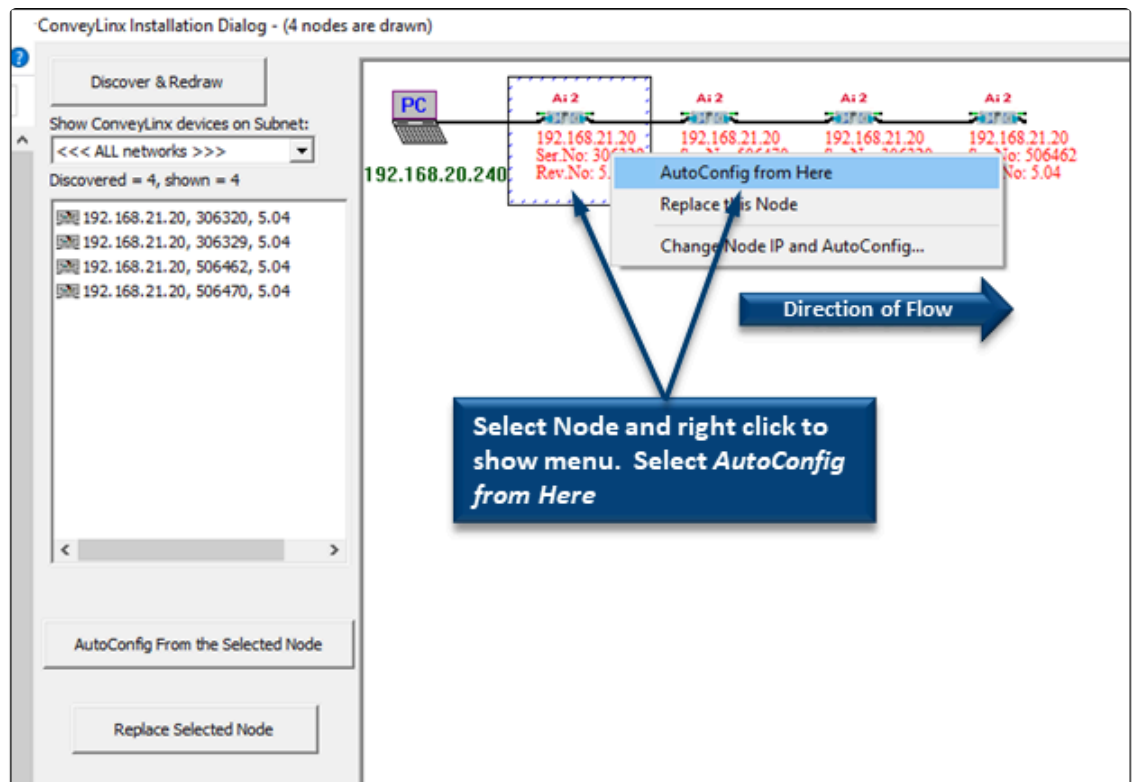
The screenshot shows the 'ConveyLinX Advanced Dialog' window. The 'Network Services' tab is selected. Under the 'Show devices on Subnet' section, the dropdown menu is set to '<<< ALL networks >>>' and the 'Discover' button is highlighted with a red rectangle. The 'Discovered modules' list is empty. The 'Settings of the selected node' section contains fields for Serial Number, IP, Mask, and Gateway (checked), along with a 'Set' button and a 'position' dropdown. At the bottom, there are buttons for 'Select ALL', 'Select NONE', 'Reset Name & IP', 'Backup', 'Restore', 'Restore by IP', 'AutoConfig', 'Reorder IPs', and 'Upgrade FW'. A note at the bottom left states '* Use Ctrl/Shift for multiple selection'.

After a few seconds, the discovered Modules appear in the module table, click the *AutoConfig* button



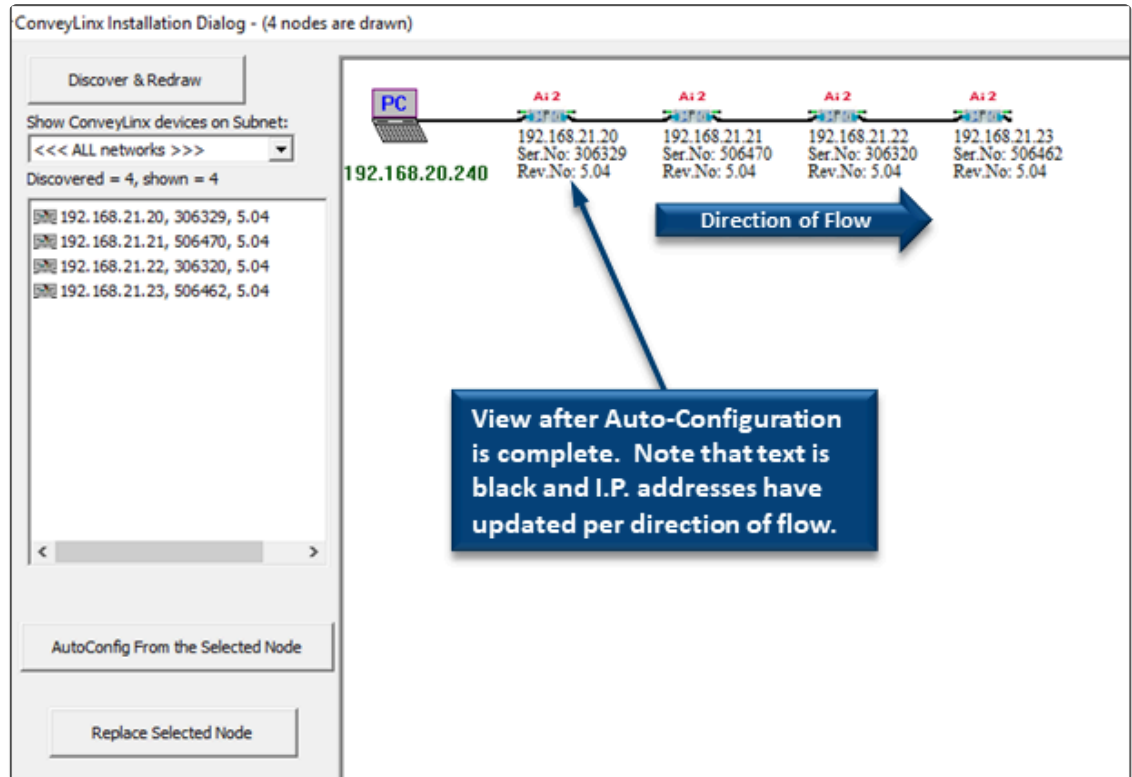


After a few seconds each Module is shown in physical topology order from the PC



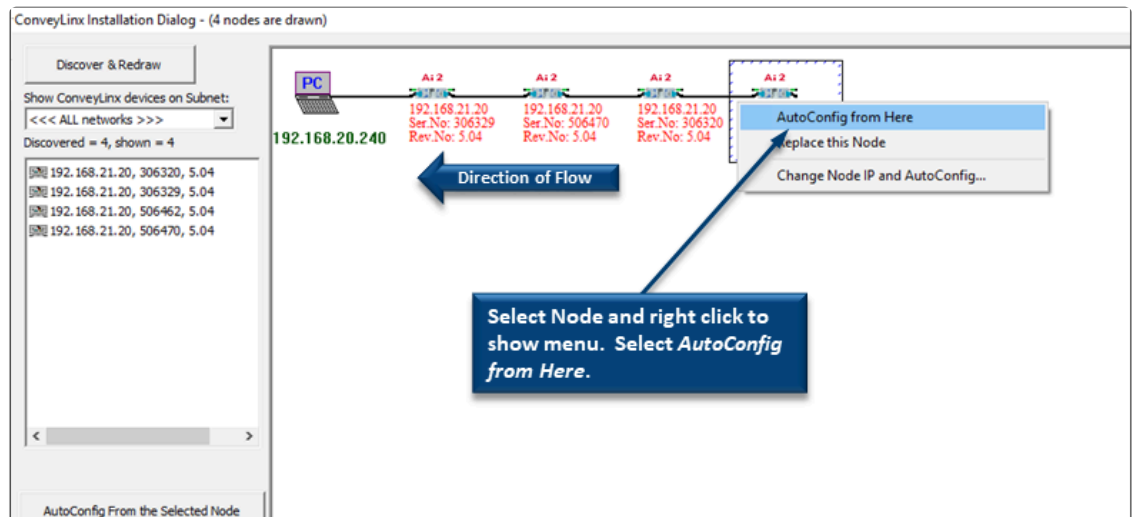
If the most upstream module is the one closest to the PC, select it, then right click and select *AutoConfig from Here*. This will start the procedure.

When the procedure is done, you will see the text go from red to black and you will notice that the I.P. addresses have updated per the direction of flow

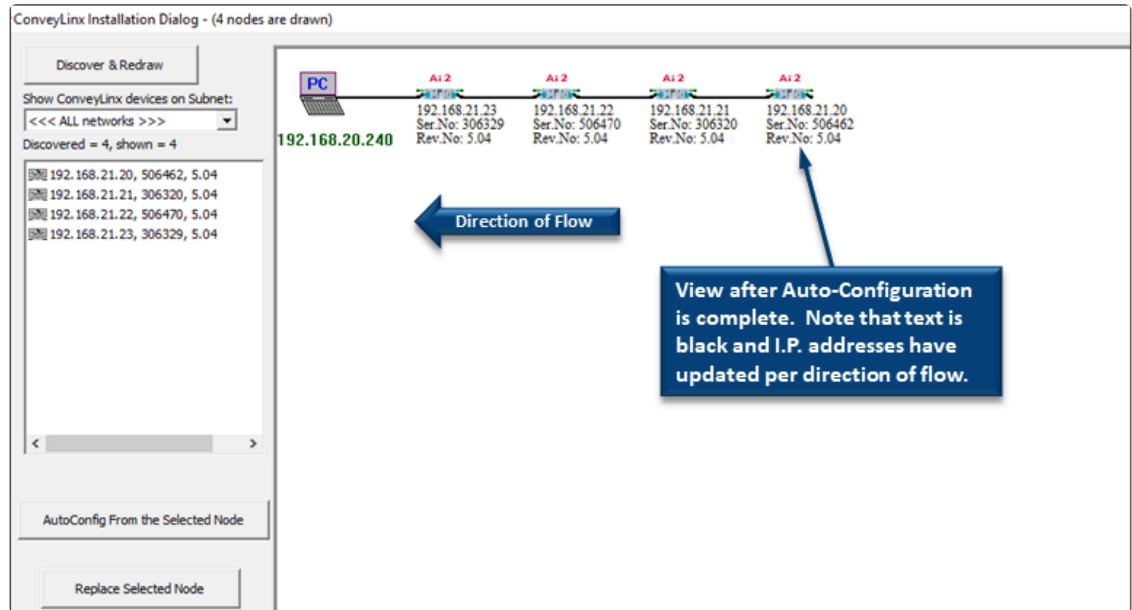


To Change the Direction of Flow – Select the Module at the Opposite End of the Network

If the most upstream module is the one farthest from the PC, select it, then right click and select *AutoConfig from Here*. This will start the procedure.



When the procedure is done, you will see the text go from red to black and you will notice that the I.P. addresses have updated per the direction of flow



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

Last modified: Aug 18, 2020

5.8. Expected Results

When the **Auto-Configuration Procedure** routine is complete, each Ai2 Module will automatically reboot. When a Ai2 Module has been successfully configured and rebooted, its **Module Status** LED will blink on and off green.

When the module has been properly configured and is operational, 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 Ai2 Modules being configured. Larger networks will take more time than smaller networks

How to verify success

Conveyor Operation

Place a carton on your empty conveyor so that it blocks the most upstream zone's sensor. It should convey all the way to the discharge end and the last most downstream zone should try to convey it off the end of its zone. If this does not happen, then at the point where the carton stops, check that module's motor connection is sound and that the zone's sensor is properly aligned. If the sensor was not properly plugged in and powered when the **Auto-Configuration Procedure** was performed, you will have to perform the procedure again. If the sensor was powered but is misaligned when the **Auto-Configuration Procedure** was performed, you can either perform the procedure again or use [EasyRoll to change the logical polarity of that particular sensor](#).

Examine the Network

While the **Auto-Configuration Procedure** is in process, you should see all of your modules' LEDs flashing on and off red. If this is not the case, then check your Ethernet cables and connections and power connections.

To verify that all the modules you expected to be configured are in fact configured, with **EasyRoll** you can connect to your newly configured Ai2 Module network and perform a [Discover function](#). The **Discover**

function will display all modules that it finds and from the list your most upstream Ai2 Module should have the 4th octet of its IP Address as .20 and you should see each module you configured in the list.

Last modified: Aug 18, 2020

5.9. What to do if things go wrong

Module Status LEDs Blinking Green with unexpected results

- Check that all sensors are operational and that all zones are clear then perform procedure again. [How to change block/clear sensor logic without having to perform another Auto-Configuration](#)
- Check all network and power connections and make sure there is 24V on each Ai2 Module then try the Auto-Configuration procedure again
- Verify that all of the module sensor/motor combinations are valid. [Check here to find out what module set-ups will generate errors](#)

Module Status LED is Blinking or Flashing Red

- Make sure there are no other Ethernet devices (PC's, Switches, Scanners, etc.) connected between any of the module on your network. The Auto-Configuration procedure aborts when it encounters a non ConveyLinx device along the network path before reaching the last module. Ai2 Modules up to that point should be configured properly but the remaining modules will not.
- When removing a Ai2 Module from an existing configured network that is already operational; be sure to wait 1 or 2 minutes to allow the Ethernet Switches on the modules to reset their MAC Address ARP table before attempting a new Auto-Configuration procedure

Last modified: Aug 04, 2020

6. Default Settings and Operation

After Auto-Configuration, the modules on your newly configured network are in ZPA mode and set to Singulation Release.

If all module and/or Network 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 Procedure is successful.

Learn About:

[Singulation Release Mode](#)

[Flex Zone Recognition](#)

[Jam Conditions](#)

[Automatic Module Replacement](#)

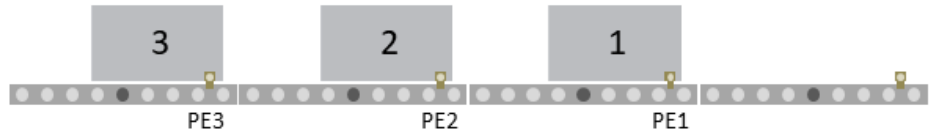
[How to Reset to Factory Defaults](#)

Last modified: Aug 05, 2020

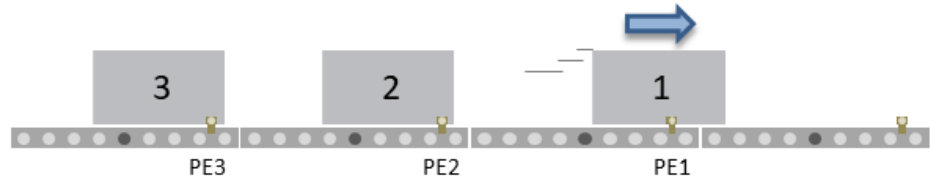
6.1. Singulation Release Mode

Singulation Release is the mode where the Ai2 Module requires that its neighboring downstream zone must be clear before it releases an item.

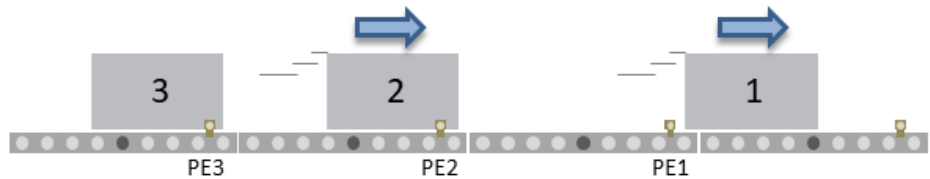
All 3 Cartons are accumulated



Carton 1 releases – Cartons 2 and 3 remain accumulated



When Carton 1 clears PE1 then Carton 2 releases



[View other ZPA Release Modes and how to change them](#)

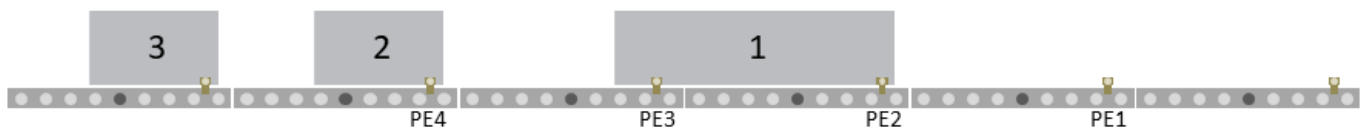
Last modified: Aug 04, 2020

6.2. Flex Zone Recognition

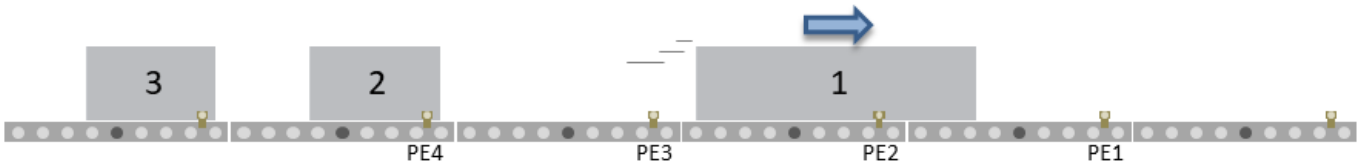
Ai2 Modules will automatically detect that a given carton is longer than one zone length and automatically adjust accumulation control so that the longer carton occupies two logical zones and will keep the next upstream carton from conveying into the longer carton.

! Flex Zone mode only functions in singulation release mode

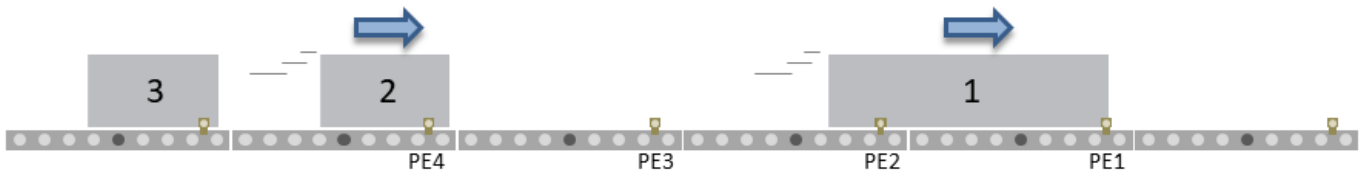
All 3 Cartons are accumulated and the Zone at PE3 has Flex Zone enabled



Carton 1 Releases – Even though PE3 is clear, because it has Flex Zone enabled, Carton 2 remains accumulated



When Carton 1's leading edge reaches PE1, Flex Zone is cleared from the Zone at PE3 and Carton 2 releases



! 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 may produce undesirable results such as excessive detected jam conditions and faults.

[How to disable Flex Zone operation with EasyRoll](#)

Last modified: Aug 18, 2020

6.3. Jam Conditions

There are two (2) types of Jam conditions detected by the Ai2 Module:

Sensor Jam

Arrival Jam



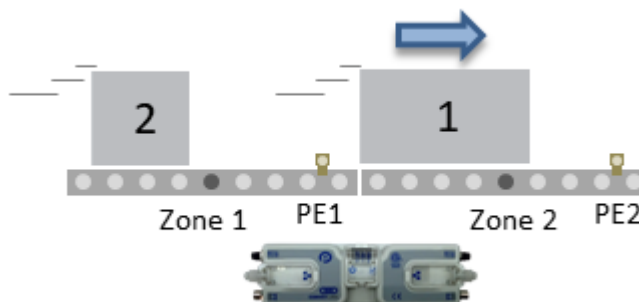
Both of these Jam conditions utilize a single Jam Timer that has to expire in order for the condition to be active. Once either of these jam conditions becomes active; they will automatically clear in the logic after the Auto Clear Time has expired. Both the Jam Time and Auto Clear Time values are 5 seconds each by default. Please see [How to Change Jam and Auto Clear Timers](#)

Last modified: Jul 21, 2020

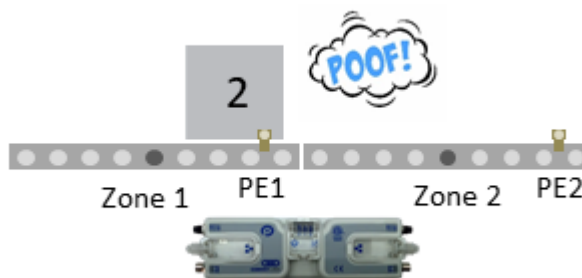
6.3.1. Arrival Jam

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 Ai2 Module will produce an **Arrival Jam** fault. Once an **Arrival Jam** occurs, the Ai2 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 Time** values are set to 5 seconds for each. This condition will be indicated on the corresponding [Sensor LED on the module](#)

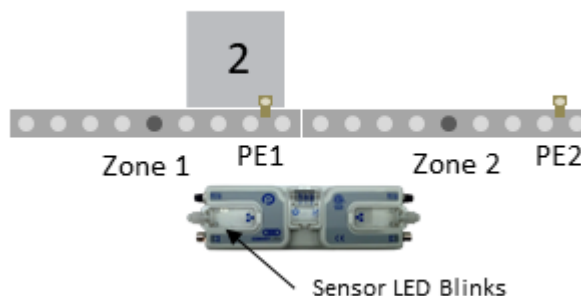
Carton 1 has left PE1 and is on its way to PE2 and because PE1 is clear, Carton 2 is entering Zone 1




Carton 1 disappears but the Zone 2 motor continues to run for the Jam Time period (5 sec. by default). During this time Carton 2 arrives at PE1 but Zone 1 stops because Jam Timer is still timing



When the Jam Timer expires, the Sensor LED blinks to indicate an Arrival Jam and keeps blinking for the Auto Clear Time (5 sec. by default). When Auto Clear Time expires, the Arrival Jam is reset and Carton 2 will release if Zone 2 is empty



 [How to Disable Arrival Jam](#)

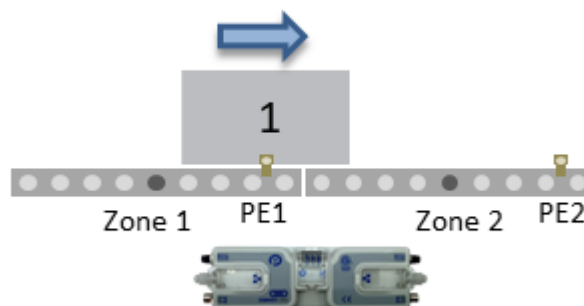
 [How to change the Jam and Auto Clear Timers](#)

Last modified: Aug 18, 2020

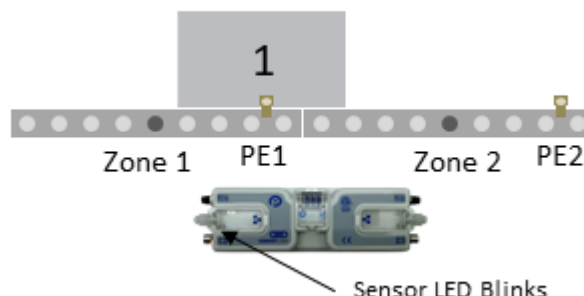
6.3.2. Sensor Jam

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 Ai2 Module will detect a Sensor Jam. This will be indicated on the corresponding [Sensor LED on the module as shown here](#)

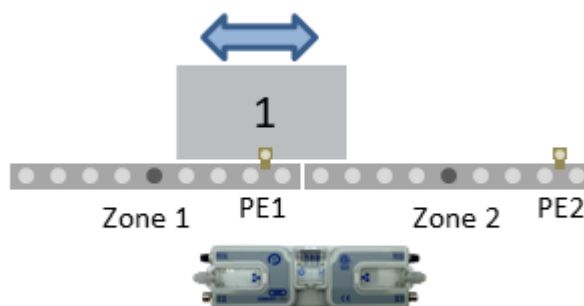
Carton 1 is leaving Zone 1 but has got stuck. Zone 1 and Zone 2 motors are running but PE1 is remaining blocked



When the Jam Timer has expired (5 sec. by default) Zone 1 and Zone 2 motors stop and Zone 1 Sensor LED flashes green/amber for the Auto Clear Time (5 sec. by default)



When the Auto Clear Timer has expired, Zone 1 will start performing the Sensor Jam Auto Clear procedure



Here is what happens when Sensor Jam Auto Clear procedure occurs

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.



If item is still blocking the sensor after Sensor Jam Auto Clear procedure is complete you have to physically clear the jam by removing the item or [you can attempt another Auto Clear procedure](#)



The 5 second Jam Timer and Auto Clear Timer values are default settings. [How to change Jam and Auto Clear Timers in EasyRoll](#)



[How to Disable Sensor Auto Clear Function](#)

Last modified: Aug 18, 2020

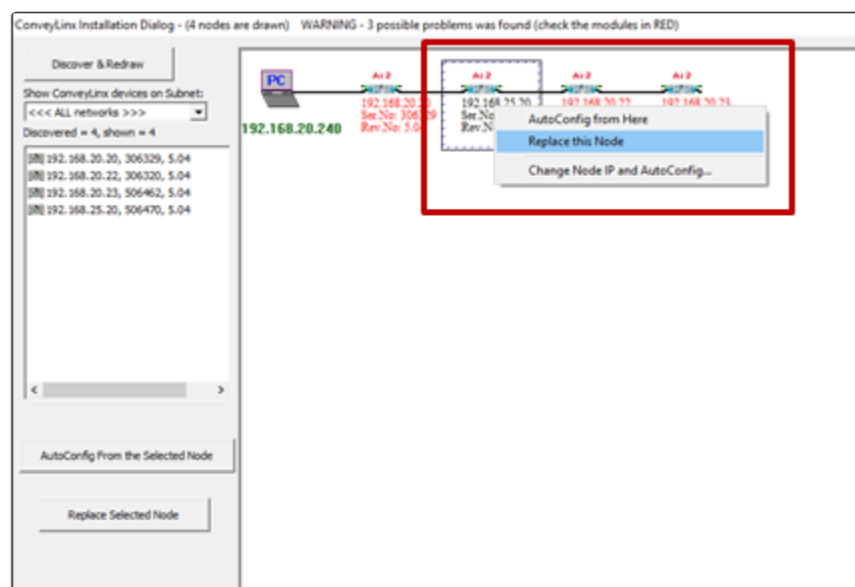
6.4. Automatic Module Replacement

Once a linear conveyor has been commissioned by Auto-Configuration Procedure, the Ai2 Module 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 Ai2 Module firmware uses this feature to allow for easy module replacement so that the entire linear conveyor does not have to be Auto-Configured again in order to replace a single Ai2 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

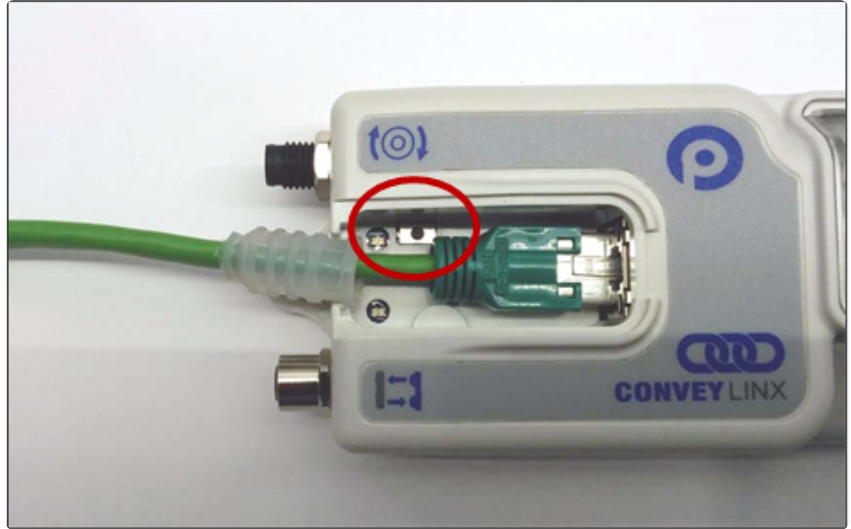
Module Replacement Using EasyRoll

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 AutoConfig button and after a few seconds the topology of the ConveyLinx modules will be displayed.
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.

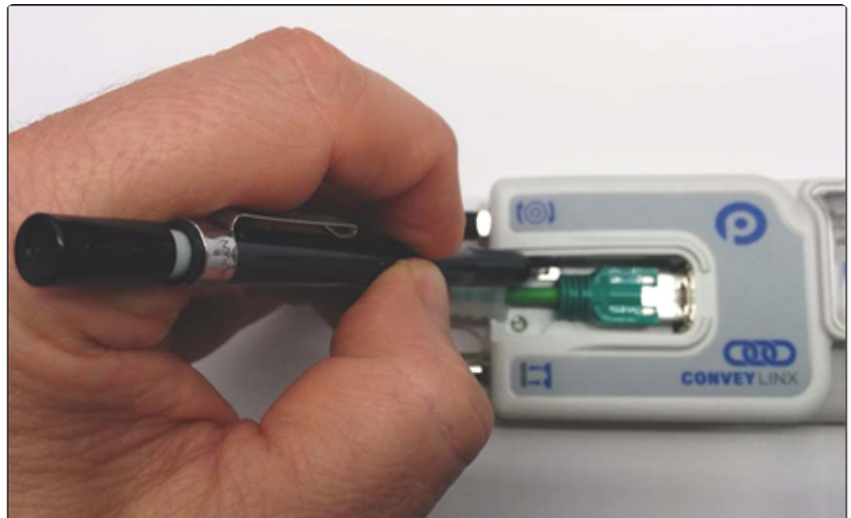


Module Replacement Using Replacement Button

Disconnect existing module's motor(s), network, photo-sensor(s), and power connections. The order of disconnection does not matter. Connect new module's motor(s), sensor(s), network connections and power connections. 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

Last modified: Aug 18, 2020

6.5. Reset to Factory Default Settings

There may be instances when you want to return a Ai2 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 and then release
3. When the Module Status LED blinks green, the procedure is complete



Factory Default Settings

Item	Value or Setting
IP Address Settings	IP: 192.168.21.20
	Subnet Mask: 255.255.128.0
	Default Gateway: 192.168.202.1
Left & Right Motor Settings	Senergy ECO
	Normal Braking
	1 m/s Speed
	CW Direction
	30 mm Acceleration
	30 mm Deceleration
Module Mode	PLC I/O
Look Ahead & Timing Settings	JAM Timer = 5.00
	Auto Clear Timer = 5.00
	Run After Timer = 5.00
	Sensor Debounce = 0.10
	All Induct Timers = 0.00

Control Ports	All Options Unchecked
Sensors	Sensors are "ON is Blocked"
Connections	All are Cleared

Last modified: Aug 18, 2020

7. EasyRoll Software

We introduced the EasyRoll software in section Auto-Configuration. In that section the [software installation](#), [connecting to your PC](#) and using the Advanced Dialog to Discover and [AutoConfigure](#) your modules was covered.

Last modified: Jul 30, 2020

7.1. Main Screen

EasyRoll Version 4.19 (US) Current IP: 192.168.21.33

Network IP: 192 . 168 . 21 . XX **1**

From Node #: 14 To Node #: 14 - + Set All

Serial Number: 663705 **2**

Firmware Version: 6.90.0 Hardware Revision: 6, Ai2

Left Link: ☒ Right Link: ☒

Upstream Zone

ZPA Mode: Singulation Set All

GAP Timer: 0.00 sec Set **3**

T-zone Accept time: 0.00 sec Set

Settings: ☐ Disable Sensor Jam Auto Clear ☐ Disable Arrival Timeout ☐ Disable Arrival Jam Reset Delay ☐ Disable Manual Operations ☐ Disable Sensor Jam Reset Delay Set All

Arrival/Departure: 14/14 **4** Accumulate

Left MDR

Motor Type: Senergy-Ai ECO **5** Set All

Brake Method: Normal Set All

Real Speed: 0.000 m/s

Speed: 0.500 m/s Set Set All

CW/CCW: CW Set All

Acceleration: 30 mm Set Set All

Deceleration: 30 mm Set Set All

Current: 0 mA

Operating time: 721 min **6** RUN

Motor Temperature: < 40 °C

Module Temperature: 56 °C

Error and Information

Sensor Connection Error: ☒ Sensor Gain Error: ☒ Error Counter: 0

Motor Connector Error: ☒ Voltage drop (<18V): ☒ Motor short-circuit: ☒ Max. Torque: ☒ Overload: ☒ Motor stalled: ☒ Motor Sensor Error: ☒ Overheat: ☒ Motor Error Counter: 0 Overvoltage(>30V): ☒ **7**

Downstream Zone

ZPA Mode: Singulation Set All

GAP Timer: 0.00 sec Set **3**

T-zone Accept time: 0.00 sec Set

Settings: ☐ Disable Sensor Jam Auto Clear ☐ Disable Arrival Timeout ☐ Disable Arrival Jam Reset Delay ☐ Disable Manual Operations ☐ Disable Sensor Jam Reset Delay Set All

Arrival/Departure: 14/14 **4** Accumulate

Right MDR

Motor Type: Senergy-Ai ECO **5** Set All

Brake Method: Servo Brake Set All

Real Speed: 0.000 m/s

Speed: 0.500 m/s Set Set All

CW/CCW: CW Set All

Acceleration: 30 mm Set Set All

Deceleration: 30 mm Set Set All

Current: 0 mA

Operating time: 727 min **6** RUN

Motor Temperature: < 40 °C

Module Temperature: 56 °C

Error and Information

Sensor Connection Error: ☒ Sensor Gain Error: ☒ Error Counter: 0

Motor Connector Error: ☒ Voltage drop (<18V): ☒ Motor short-circuit: ☒ Max. Torque: ☒ Overload: ☒ Motor stalled: ☒ Motor Sensor Error: ☒ Overheat: ☒ Motor Error Counter: 0 Overvoltage(>30V): ☒ **7**

Blink&Wink Diagnostic Log Refresh Advanced Dialog Close

Diagram of the roller assembly with a blue arrow indicating direction **8**

Indicator	Description
1	Network IP – This is where you enter the Subnet of the particular ConveyLinx network you wish to connect
2	Node No. – This is where you enter a range of Nodes in which to connect. Entering values here will cause the “Refresh” 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 particular zone as well as several check boxes to change the default

	operation of certain jam conditions, etc.
4	Upstream Zone / Downstream Zone – Selector to cause the local zone to Accumulate if a carton arrives and to cause the local zone to be in Accumulate mode upon power up of the module
5	Left MDR / Right MDR – Selections for MDR type, speed control, acceleration, deceleration, etc.
6	Left MDR / Right MDR – Selector to click to jog the MDR, click again to stop
7	Left MDR / Right MDR – Visual indicators for various MDR status and diagnostics information
8	Diagnostic Window – Click the graphic image to open a details Diagnostics window

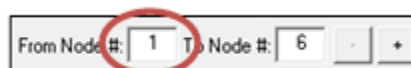


Please note that some of the detailed information shown in this figure may be different for your particular system and that most of these fields will be blank until you actually initiate communications

Last modified: Aug 05, 2020

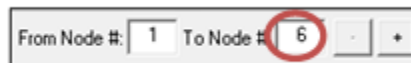
7.1.1. Node Navigation

Whatever value is entered in the **From Node #** box will be the particular module Node data shown in the remainder of the main screen.




From Node #: 1 To Node #: 6 - +

The value entered in the **To Node #** box does not have to be the actual “last” Node of the network. If you enter a value higher than what exists; an error message will display after you click the **Refresh** button. For the example shown; if there were only 4 Nodes installed and you entered 6, you would receive 2 error messages in succession after clicking the **Refresh** button



From Node #: 1 To Node #: 6 - +

Clicking the + and – buttons will increment / decrement the Node value in the **From Node #** 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



From Node #: 1 To Node #: 6 - +

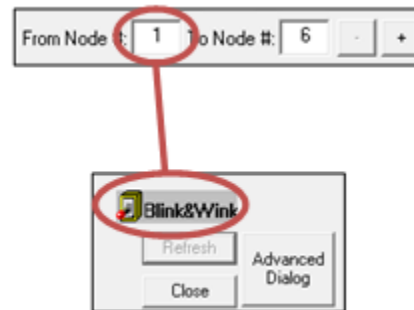
- * Anywhere on the Main Screen where you see a **Set All** button next to a parameter or data entry selection, all the nodes in the range entered in the **From Node #** and **To Node #** will be updated with the same parameter or data entry selection when you click the associated **Set All** button. A dialog box will appear to confirm your selection.

Last modified: Jul 30, 2020

7.1.2. 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 **From Node #** text box 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 of its LED indicators. Click the **Blink & Wink** switch again to turn this off

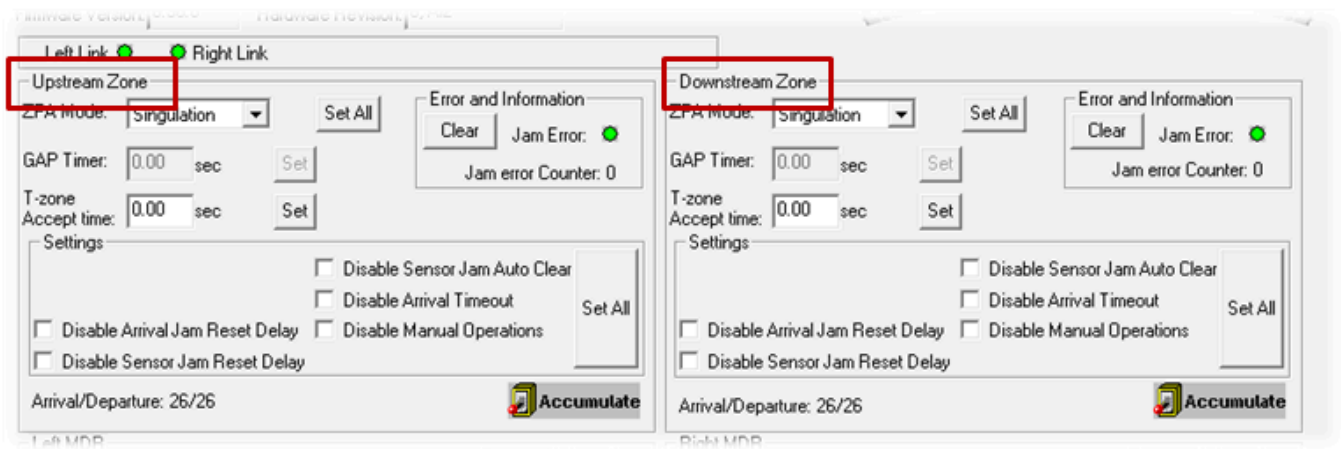


! Please note that when Blink & Wink is active, the module stops all motors

Last modified: Jul 30, 2020

7.1.3. ZPA Upstream/Downstream Zone Settings

On the main screen there are areas to configure the **Upstream** and **Downstream** Zone settings. The **Upstream** and **Downstream** settings are set independent of one another so you can customize your ZPA functionality based upon your specific needs.



Last modified: Aug 18, 2020

7.1.3.1. Release Mode

Selecting the pull-down box for ZPA Mode will show the available selections. Singulation is the default configuration

The screenshot shows the 'Upstream Zone' configuration window. It includes a 'ZPA Mode' dropdown menu currently set to 'Singulation', with a 'Set All' button next to it. Below this is a 'GAP Timer' section with a dropdown menu showing 'Singulation', 'Train', and 'GAP Train', and a 'Set' button. The 'T-zone' section shows 'Accept time: 0.00 sec' with a 'Set' button. An 'Error and Information' section contains a 'Clear' button, a 'Jam Error' indicator (a green light), and a 'Jam error Counter: 0'. A 'Settings' section has several checkboxes: 'Disable Sensor Jam Auto Clear', 'Disable Arrival Timeout', 'Disable Arrival Jam Reset Delay', 'Disable Manual Operations', and 'Disable Sensor Jam Reset Delay', along with a 'Set All' button. At the bottom, it shows 'Arrival/Departure: 26/26' and an 'Accumulate' button with a small icon.

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

* Singulation Release Mode is the default setting and it is [described in the Default Settings and Operation section](#)

* Please note that Singulation and Train Release Modes are configurable per Zone and can be mixed on the same network

Last modified: Aug 06, 2020

7.1.3.1.1. Singulation Release

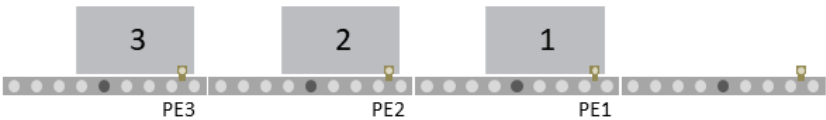


Singulation Mode is the default setting and it is [described in the Default Settings and Operation section](#)

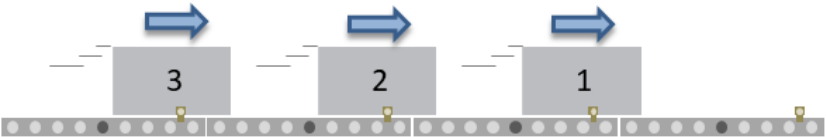
Last modified: Jul 30, 2020

7.1.3.1.2. Train Release

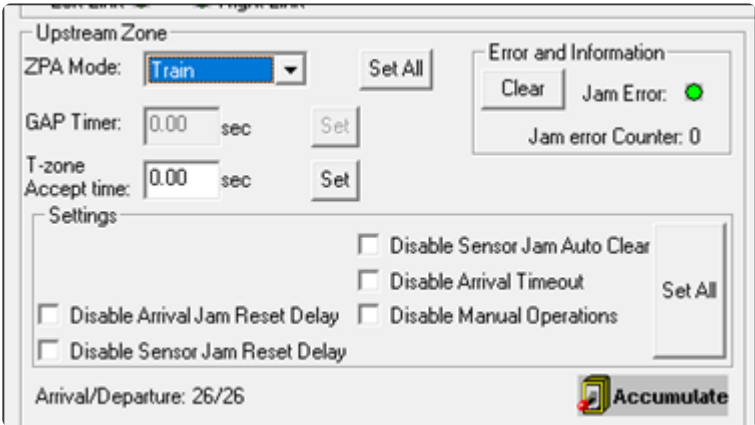
All 3 Cartons are Accumulated



When Carton 1 releases – Cartons 2 and 3 also release at the same time



Select **Train** from the pull-down box for **Train Mode**

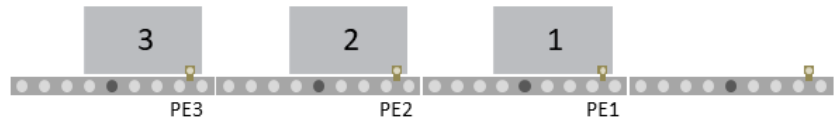


! Please note that starting many zones in Train Release mode particularly with heavy loads can cause voltage drops on your power supplies. Be sure to take care in sizing your power supply needs. You should consider GAP Train Release Mode if power supply sizing is a concern

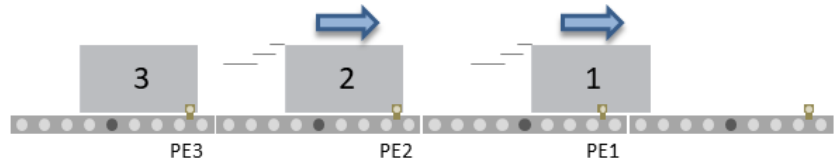
Last modified: Aug 18, 2020

7.1.3.1.3. GAP Train Release

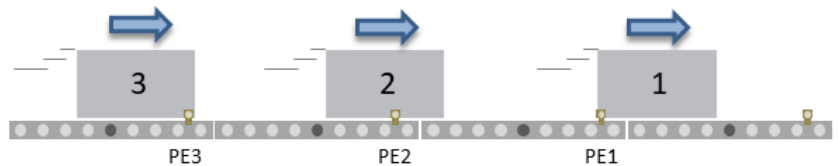
All 3 Cartons are Accumulated



When Carton 1 releases and Zone 2's GAP time has expired, Carton 2 will begin to release. Carton 3 remains accumulated



When Carton 2 releases and Zone 3's GAP timer has expired, Carton 3 will begin to release



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. In this example we entered 0.35 seconds

The screenshot shows a software window titled 'Upstream Zone'. It has a 'ZPA Mode' dropdown menu set to 'GAP Train'. Below it, the 'GAP Timer' is set to '0.35 sec' with a 'Set' button. The 'T-zone Accept time' is set to '0.00 sec' with a 'Set' button. There are several checkboxes under 'Settings': 'Disable Sensor Jam Auto Clear', 'Disable Arrival Timeout', 'Disable Arrival Jam Reset Delay', and 'Disable Sensor Jam Reset Delay'. A 'Set All' button is to the right of these settings. At the bottom, it says 'Arrival/Departure: 26/26' and has an 'Accumulate' button with a small icon. On the right side, there is an 'Error and Information' section with a 'Clear' button, a 'Jam Error' indicator (a green light), and a 'Jam error Counter: 0'.

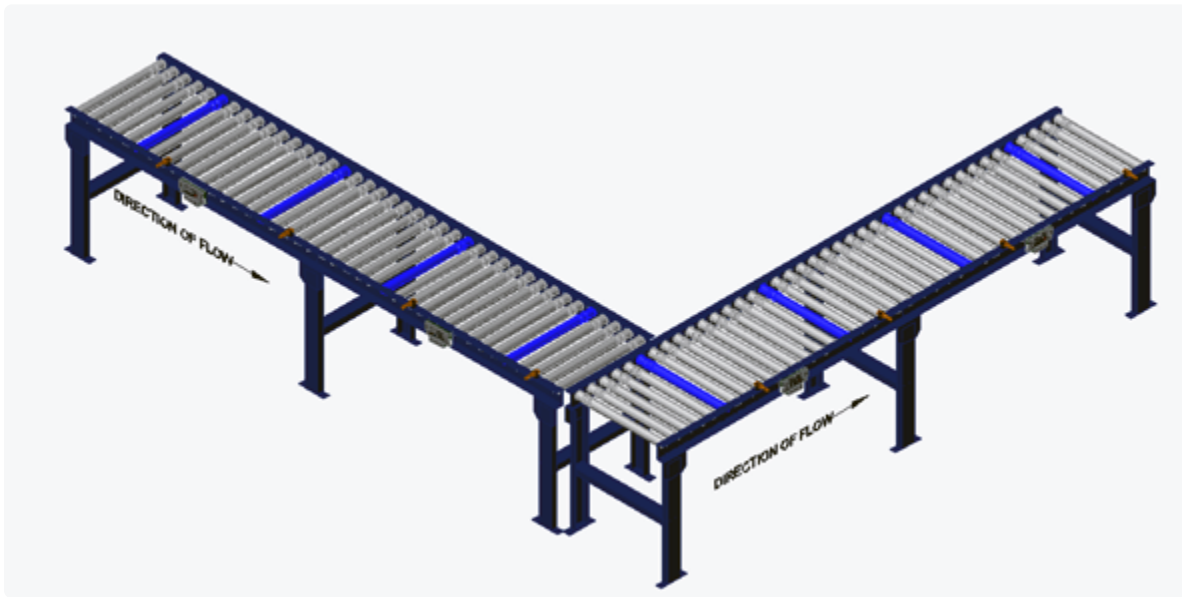
! Please note the GAP time does not create a gap or cause any delay when items are in transportation. The Gap timer is only activated when a given zone accumulates an item and then it is allowed to release

* 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. If the time value is long enough, the result may appear to be **Singulation Release** mode or even Singulation Release with extra time delay. 0.2 to 0.3 seconds are typical values used when you want to help balance the loading on your power supplies but still have the operation be very close to **Train Release Mode**

Last modified: Aug 18, 2020

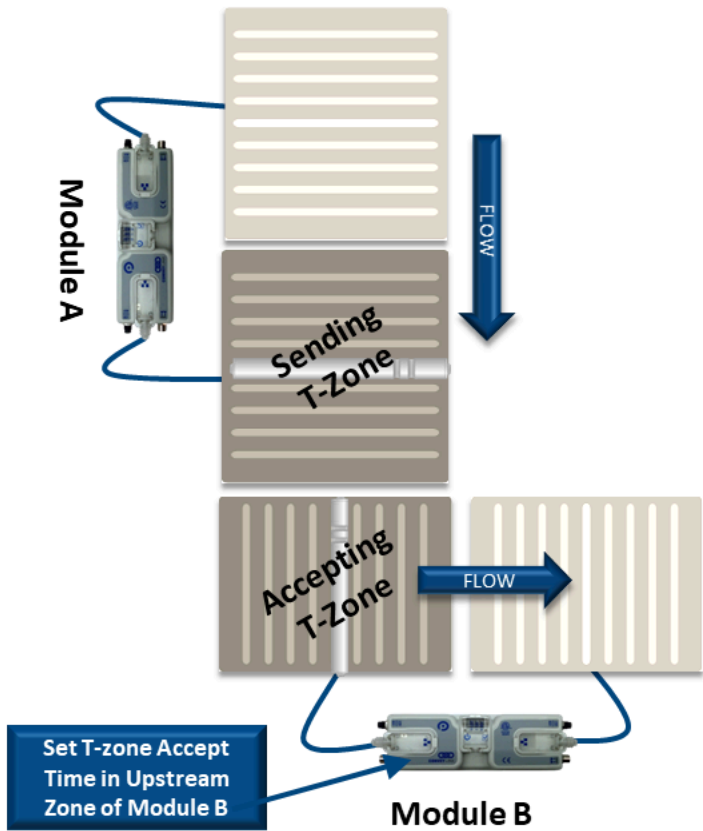
7.1.3.2. T-Zone Settings

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 of 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.

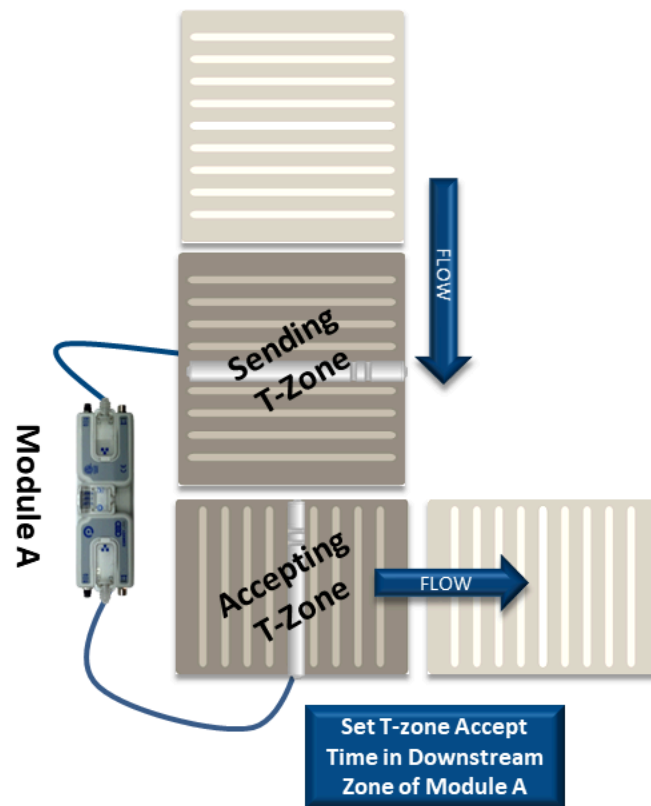


Material handling considerations such as discharge conveyor speed and load weight have to be analysed prior to implementing a T-Zone configuration. Be sure to verify your mechanical design and carton characteristics before utilizing a T-Zone arrangement.

T-Zone Between 2 Separate Modules



T-Zone on a Single Module



Enter the value and click the Set button. In this example we entered 1.5 seconds. Whether to change the Upstream Zone or Downstream Zone value on the main screen is dependent upon which zone is the **accepting zone**

The screenshot shows the software interface for the T-zone configuration. The 'Upstream Zone' section includes a 'ZPA Mode' dropdown set to 'Singulation', a 'GAP Timer' set to '0.00 sec', and a 'T-zone Accept time' set to '1.50 sec'. Each of these has a 'Set' button. The 'Error and Information' section includes a 'Clear' button, a 'Jam Error' indicator (green dot), and a 'Jam error Counter: 0'. The 'Settings' section includes several checkboxes: 'Disable Sensor Jam Auto Clear', 'Disable Arrival Timeout', 'Disable Arrival Jam Reset Delay', 'Disable Manual Operations', and 'Disable Sensor Jam Reset Delay'. There is a 'Set All' button for the settings. At the bottom, it shows 'Arrival/Departure: 26/26' and an 'Accumulate' button.



The T-zone Accept time is always applied to the accepting zone

Last modified: Aug 18, 2020

7.1.3.3. ZPA Error and Information

There is an **Error and Information** area in the upper right corner in both the Upstream and Downstream Zone areas of the **Main Screen**. There is an indicator that shows if a Jam condition is active (either [Arrival Jam](#) or [Sensor Jam](#)). There is a numerical indicator of all occurrences of any Jam conditions since the last module power cycle. There is also a Clear button to allow you to clear a **Sensor Jam** if it is active.



- * The *Clear* button is a convenience so you do not have to go the zone in question and remove or otherwise clear the item from the zone sensor. If [Sensor Jam Auto Clear](#) is enabled, clicking the Clear button will re-initiate this procedure.

Last modified: Aug 14, 2020

7.1.3.4. Accumulate Control from Main Screen

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

Clicking the icon will initiate the **Accumulate** function and the icon will highlight and change state

Clicking the icon again will turn off the **Accumulate** function

* When you set **Accumulate** from *EasyRoll*, this is saved to the module's flash memory so that when you cycle power on the module, it will power up in the accumulated state.

Last modified: Aug 18, 2020

7.1.3.5. Settings Checkboxes

Both the **Upstream** and **Downstream** ZPA Zones have Settings check boxes to allow you to customize some of the ZPA behavior. These settings can apply to only the zone you are connected to and viewing or you can apply the same settings to multiple modules in a range of module nodes.

[Disable Reset Delays](#)
[Disable Sensor Jam Auto Clear](#)
[Disable Arrival Timeout](#)
[Disable Manual Operation](#)



Last modified: Aug 18, 2020

7.1.3.5.1. 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](#) and [Sensor Jam](#).

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

The screenshot shows the 'Upstream Zone' configuration window. It includes a 'ZPA Mode' dropdown set to 'Singulation' with a 'Set All' button. Below are 'GAP Timer' and 'T-zone Accept time' fields, both set to '0.00 sec' with 'Set' buttons. On the right, an 'Error and Information' section shows 'Clear', 'Jam Error: [green dot]', and 'Jam error Counter: 0'. The 'Settings' section contains four checkboxes: 'Disable Arrival Jam Reset Delay' (checked), 'Disable Sensor Jam Reset Delay' (checked), 'Disable Sensor Jam Auto Clear' (unchecked), and 'Disable Arrival Timeout' (unchecked). There is also a 'Set All' button and a 'Disable Manual Operations' checkbox (unchecked). At the bottom, it shows 'Arrival/Departure: 26/26' and an 'Accumulate' button with a red icon.



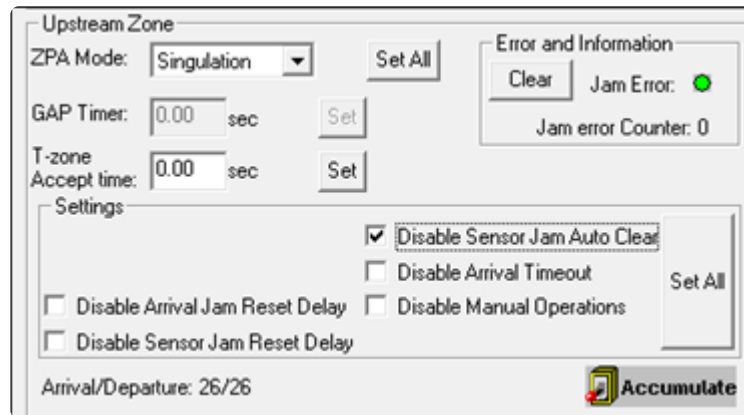
Selecting either of these options will not eliminate the detection of the particular jam condition; it simply eliminates the default **Auto Clear Time** delay the logic utilizes before automatically clearing the condition.

Last modified: Aug 18, 2020

7.1.3.5.2. Disable Sensor Jam Auto Clear

[Sensor Jam Auto Clear Procedure](#) 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



The screenshot shows the 'Upstream Zone' configuration window. It includes fields for 'ZPA Mode' (set to 'Singulation'), 'GAP Timer' (0.00 sec), and 'T-zone Accept time' (0.00 sec), each with a 'Set' button. A 'Set All' button is also present. On the right, the 'Error and Information' section shows a 'Clear' button, 'Jam Error' status (green dot), and 'Jam error Counter: 0'. The 'Settings' section contains several checkboxes: 'Disable Sensor Jam Auto Clear' (checked), 'Disable Arrival Timeout', 'Disable Arrival Jam Reset Delay', 'Disable Manual Operations', and 'Disable Sensor Jam Reset Delay'. A 'Set All' button is located to the right of these settings. At the bottom, it shows 'Arrival/Departure: 26/26' and an 'Accumulate' button with a red icon.

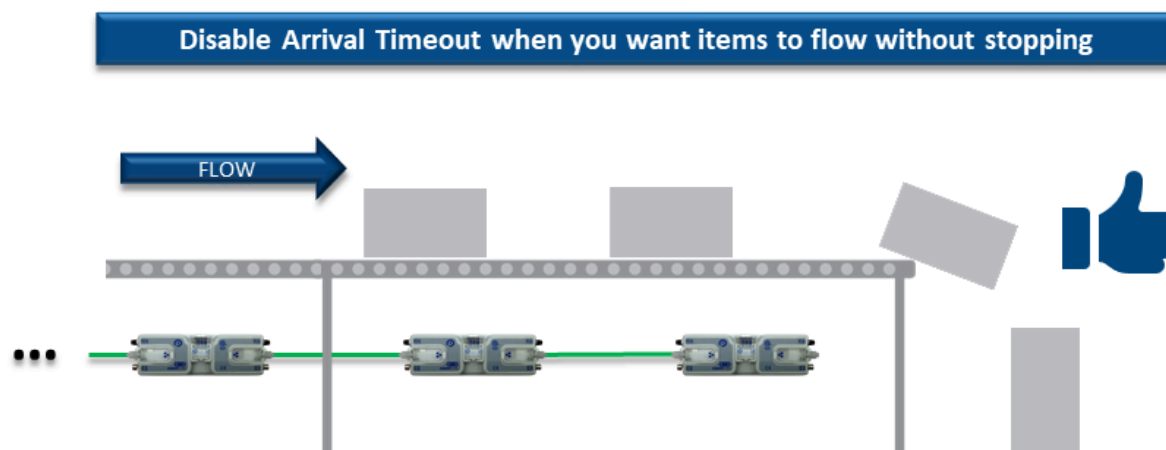


You can also attempt to clear a **Sensor Jam** using the [Clear](#) button for the Zone

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7.1.3.5.3. Disable Arrival Timeout

[Arrival Jam](#) 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

Upstream Zone	
ZPA Mode: Singulation	Set All
GAP Timer: 0.00 sec	Set
T-zone Accept time: 0.00 sec	Set
Settings	
<input type="checkbox"/> Disable Arrival Jam Reset Delay	<input type="checkbox"/> Disable Sensor Jam Auto Clear
<input type="checkbox"/> Disable Sensor Jam Reset Delay	<input checked="" type="checkbox"/> Disable Arrival Timeout
<input type="checkbox"/> Disable Manual Operations	
Set All	
Arrival/Departure: 26/26	
Accumulate	

Error and Information
Clear Jam Error: ●
Jam error Counter: 0

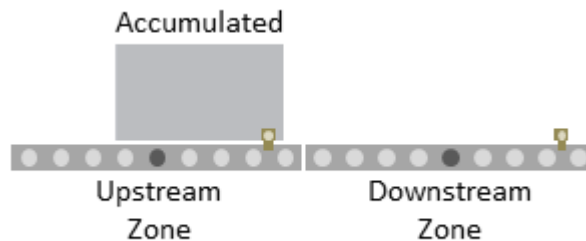
Last modified: Aug 18, 2020

7.1.3.5.4. Disable Manual Operation

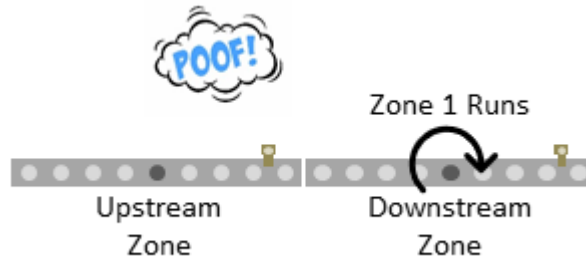
In normal ZPA operation, if a zone is in Accumulation (either by external device or if Aux I/O Pin 2 is set to Accumulate) and the carton is subsequently manually removed from the conveyor; the zone downstream of the accumulated zone will run in an attempt to “find the lost carton”. In certain applications 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”

Without Disable Manual Operations box checked

Carton accumulated in Upstream Zone by Aux I/O Pin 2 Accumulate signal or external network signal



If carton is removed from Upstream Zone, the Downstream Zone will run to “find the missing carton”. Run time is the duration of the Jam Timer setting (5 sec. by default)



With Disable Manual Operations box checked

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

Upstream Zone

ZPA Mode: Singulation Set All

GAP Timer: 0.00 sec Set

T-zone Accept time: 0.00 sec Set

Settings

☐ Disable Arrival Jam Reset Delay

☐ Disable Sensor Jam Reset Delay

☐ Disable Sensor Jam Auto Clear

☐ Disable Arrival Timeout

☒ Disable Manual Operations

Set All

Arrival/Departure: 26/26

Accumulate

Error and Information

Clear Jam Error: [Green Light]

Jam error Counter: 0

When you check the *Disable Manual Operations* check-box for the Downstream Zone, then it will not run when upstream carton is removed



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7.1.4. Motor Settings

The motor settings for the current selected module can be modified on the Main Screen

Left MDR

Motor Type:

Senergy-Ai ECO

Set All

Brake Method:

Normal

Set All

Real Speed:

0.000

 m/s

Speed:

0.500

 m/s

Set

Set All

Cw/CCw:

Cw

Set All

Acceleration:

30

 mm

Set

Set All

Deceleration:

30

 mm

Set

Set All

Current:

0

 mA

Operating time:

723

 min

Motor Temperature:

< 40

 °C

Module Temperature:

56

 °C

RUN

Error and Information

Sensor Connection Error:

Sensor Gain Error:

Error Counter: 0

Motor Connector Error:

Voltage drop (<18V):

Motor short-circuit:

Max. Torque:

Overload:

Motor stalled:

Motor Sensor Error:

Overheat:

Motor Error Counter: 0

Overvoltage(> 30V):

Right MDR

Motor Type:

Senergy-Ai ECO

Set All

Brake Method:

Servo Brake

Set All

Real Speed:

0.000

 m/s

Speed:

0.500

 m/s

Set

Set All

Cw/CCw:

Cw

Set All

Acceleration:

30

 mm

Set

Set All

Deceleration:

30

 mm

Set

Set All

Current:

0

 mA

Operating time:

729

 min

Motor Temperature:

< 40

 °C

Module Temperature:

56

 °C

RUN

Error and Information

Sensor Connection Error:

Sensor Gain Error:

Error Counter: 0

Motor Connector Error:

Voltage drop (<18V):

Motor short-circuit:

Max. Torque:

Overload:

Motor stalled:

Motor Sensor Error:

Overheat:

Motor Error Counter: 0

Overvoltage(> 30V):

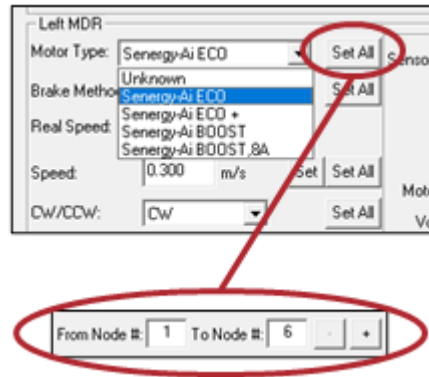
✿ Please note that the Motor Settings grouped by motor plugged into the physical Left and Right sides of the module and are not based upon Upstream or Downstream product flow.

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7.1.4.1. Motor Type

The Motor Type pull-down box lists all motor brand and types whose profiles are available for the module. Senergy-Ai 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.

In this example, 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 6; changing the selection in the **Motor Type** pull down will change Node 1 and clicking Set All will change Nodes 2 thru 6 to the same setting as Node 1



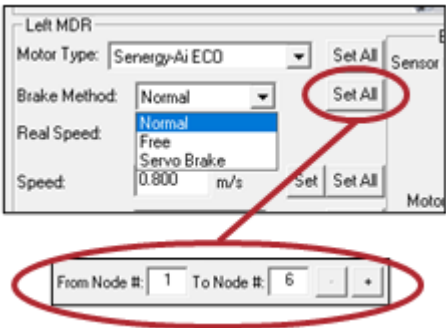
Please consult the Pulseroller Catalog Senergy Ai motor documentation and review your application if you are unsure as to which motor-type setting to use

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7.1.4.2. Brake Method

The **Brake Method** pull-down box lists all the holding brake 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.

In this example, 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 6; changing the selection in the **Brake Method** pull down will change Node 1 and clicking **Set All** will change Nodes 2 thru 6 to the same setting as Node 1



Method	>Description
Normal	Once the controls have decelerated the rotor to a stop, the motor coil are internally connected. The permanent magnet forces in the rotor and the mechanical inertia of the gearbox holds the rotor in place. This is the MDR industry standard holding brake method and is often termed short circuit or shunt. Normal is the default factory setting for all module zones from the <i>Auto-Configuration Procedure</i>
Free	Once the controls have decelerated the rotor to a stop, the motor coils are internally disconnected and only the mechanical gearbox inertia holds the rotor in place
Servo Brake	When the controls have decelerated the rotor to a stop, the processor notes the <i>Hall Effect</i> sensor status. If the <i>Hall Effect</i> sensor status changes indicating a change in position of the rotor, the controls will inject current into the motor coils in the proper sequence to move the rotor back to its original stop position

! Servo Brake function utilizes motor power and depending on the torque demanded by the motor to hold the load the potential for heat build-up exists

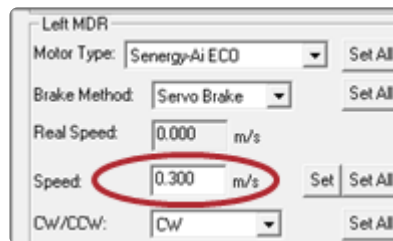
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7.1.4.3. Speed

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

Setting Speed Value

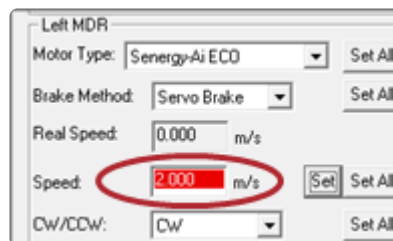
For our example roller, entering a value of "0.300" for the speed and clicking Set will set the speed to 0.3 m/s for the roller. If the background of the speed entry box remains white, then the speed is valid for the roller part number detected by the module



The screenshot shows the 'Left MDR' control window. The 'Speed' field is set to '0.300 m/s' and has a white background, indicating it is a valid setting. Other fields include 'Motor Type: Senergy-Ai ECO', 'Brake Method: Servo Brake', 'Real Speed: 0.000 m/s', and 'CW/CCW: CW'. Each field has a 'Set All' button to its right.

Speed Setting Too High

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

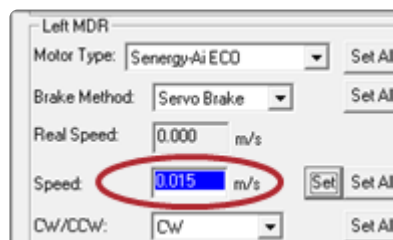


The screenshot shows the 'Left MDR' control window. The 'Speed' field is set to '2.000 m/s' and has a red background, indicating it is an invalid setting because it is too high. Other fields are the same as in the previous screenshot.

✿ Setting the speed too high will result in the motor running at its maximum defined speed

Speed Setting Too Low

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



The screenshot shows the 'Left MDR' control window. The 'Speed' field is set to '0.015 m/s' and has a blue background, indicating it is an invalid setting because it is too low. Other fields are the same as in the previous screenshots.

✿ Setting the speed too low will result in the motor running at its minimum defined speed

Setting Same Speed for Multiple Modules

Type in the desired speed in m/s. You can also use the Set All button to set the entered speed to each motor in the **From Node # / To Node #** boxes. In this example the Left MDRs from nodes 1 thru 6 will each get the same speed setting

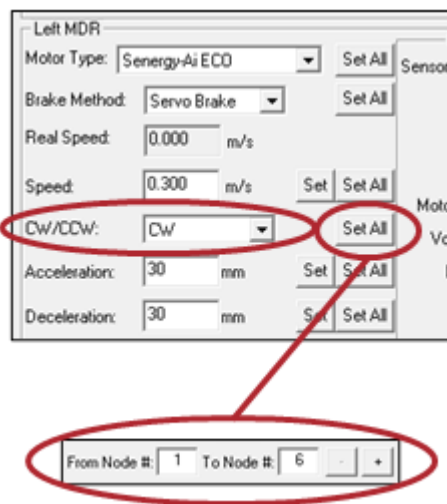
The screenshot shows the 'Left MDR' configuration window. The 'Speed' field is set to 0.300 m/s and is circled in red. To its right is a 'Set All' button, also circled in red. Below the window, the 'From Node #' is set to 1 and 'To Node #' is set to 6, with a red circle around these fields and a red arrow pointing from the 'Set All' button to them. Other settings visible include Motor Type: Senergy-Ai ECO, Brake Method: Servo Brake, Real Speed: 0.000 m/s, CW/CCW: CW, Acceleration: 30 mm, and Deceleration: 30 mm.

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7.1.4.4. Rotation Direction

This setting is either Clock-Wise (**CW**) or Counter-Clock Wise (**CCW**) and is determined for each module based upon the *Auto-Configuration Procedure* results. Please refer to section [Motor Rotation Definition](#) for details on how to determine rotation direction with respect to MDR installed orientation.

Selecting a direction from the drop-down box immediately sets the rotation direction. You can also use the **Set All** button to set the selected rotation direction to each motor in the **From Node # / To Node #** boxes. In this example the Left MDRs from nodes 1 thru 6 will each get the same **CW/CCW** rotation direction setting



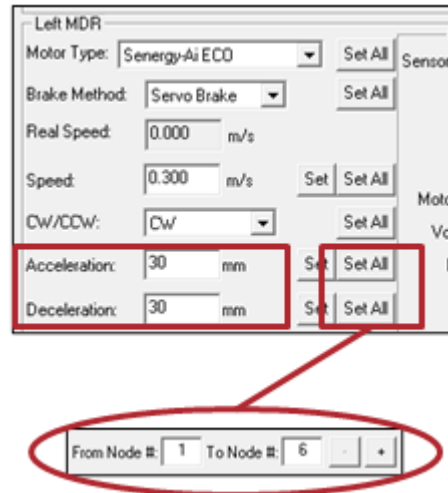
* Please note that if you change the **Rotation Direction** and this module goes through another **Auto Configuration** procedure, the **Rotation Direction** setting **will not** reset back to default. It will remain unchanged at the last selected setting.

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7.1.4.5. Acceleration/Deceleration

Acceleration and Deceleration settings are fields you enter values similar to Speed. The units of the value you enter are in mm which means that the control will accelerate and decelerate for the distance specified within the controller's current limits and the mechanical limits of the connected drive train.

In this example, 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 6; changing the selection in the **Motor Type** pull down will change Node 1 and clicking Set All will change Nodes 2 thru 6 to the same setting as Node 1



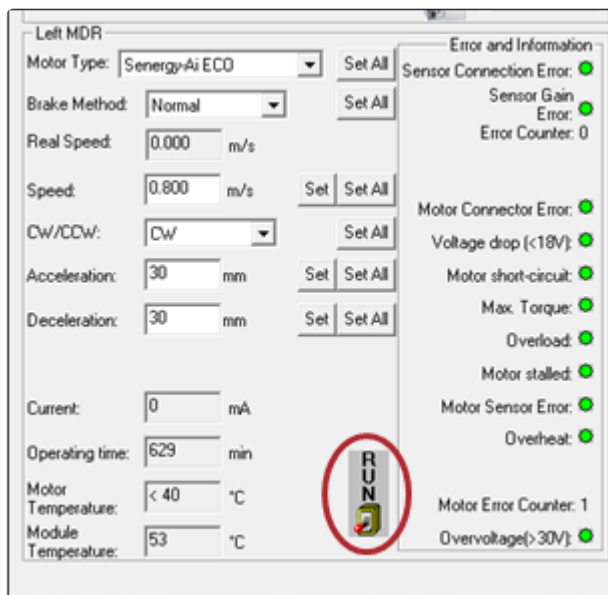
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7.1.4.6. Motor Jog and Error Indicators

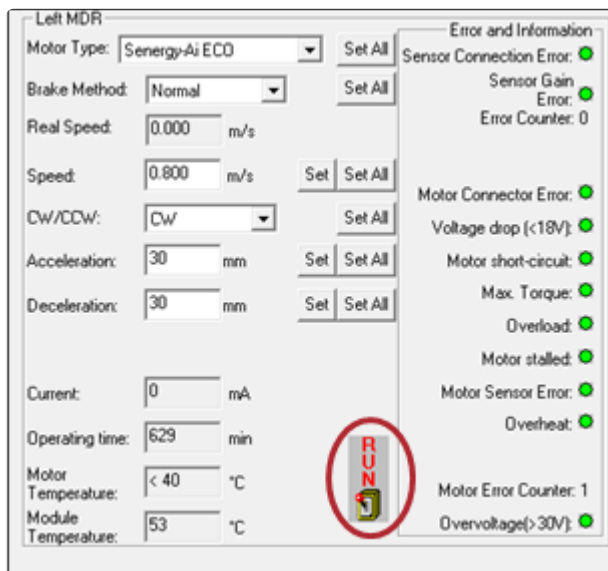
Motor Jog (Run) Function

In *EasyRoll*, the Left and Right motors have their own **Run** buttons on the *Main Screen*. These are used to temporarily run the motors for verification of function and diagnostics.

Click the **Run** icon to turn on the motor*



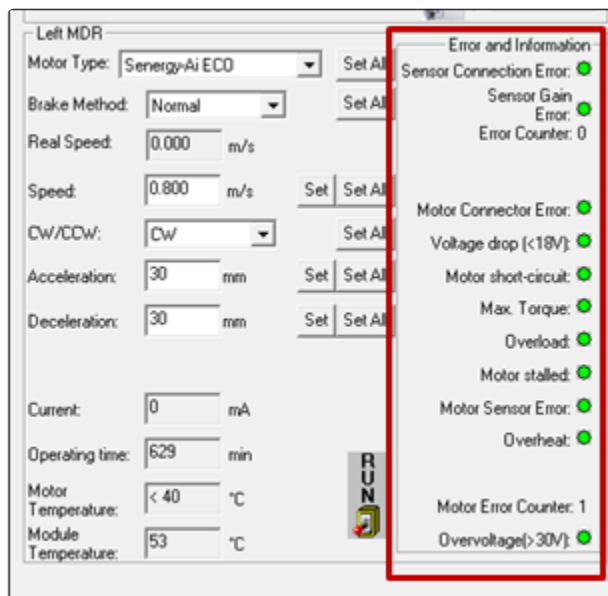
When **Run** is activated the icon highlights. Click the icon again to turn the motor off



* [Explanation of unexpected rotation direction when you run a motor from this jog function](#)

Error Indicators

In *EasyRoll*, the Left and Right motors have their own status indicators on the *Main Screen*. These are used to provide visual indication of certain conditions. There is also status indicators for the Sensors connected to the Left and Right sides of the modules.

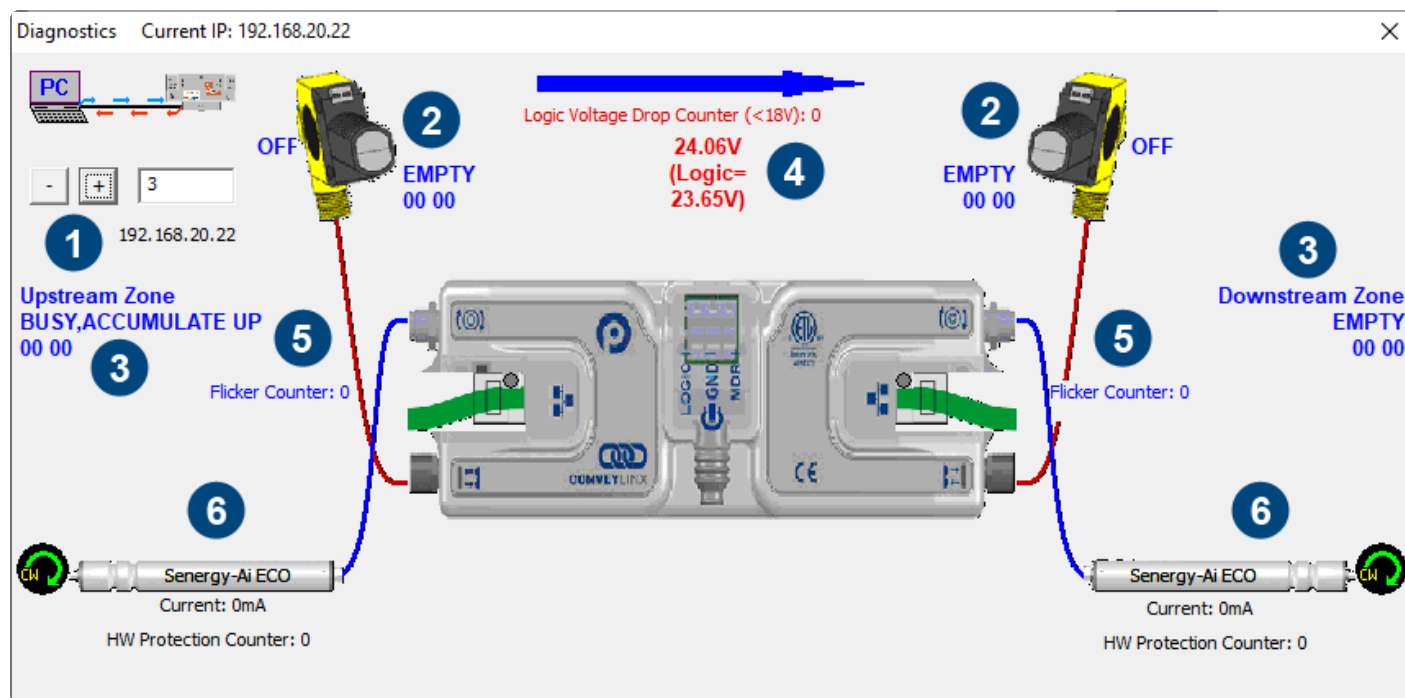


Indicator	Description
Sensor Connection Error	Occurs when the particular side of the module was Auto Configured as a zone and the sensor is unplugged or otherwise not drawing power
Sensor Gain Error	Occurs when the sensor health/gain signal on pin 3 of the Sensor port changes state from its Auto-Configuration state
Error Counter	A running numerical counter that increments for each occurrence of connection or gain errors. Counter resets to 0 upon power cycle
Motor Connection Error	Occurs when a motor that is expected to be connected becomes disconnected by either unplugging or internal damage
Voltage drop [<18V]	Occurs if the incoming power to the module drops below 18 volts
Motor short circuit	Occurs if the module detects a short circuit condition
Max. Torque	Indicator turns Yellow if the motor is delivering the maximum torque according to the selected motor profile
Overload	Occurs if motor is commanded to run and is not rotating sufficiently for at least 10 seconds
Motor Stalled	Occurs when the motor is commanded to run and the rotor is not turning
Motor Sensor Error	Occurs if one or more of the 3 Hall Effect Sensors does not produce a signal or does not change state when motor is running
Overheat	Occurs when the calculated motor temperature has exceeded 105°C or the

	module temperature has exceeded 90°C
Motor Error Counter	A running numerical counter that increments for each occurrence of any of the motor error conditions. Counter resets to 0 upon power cycle
Overvoltage [>30V]	Occurs when the incoming power to the module exceeds 30V

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7.1.5. Diagnostic Window



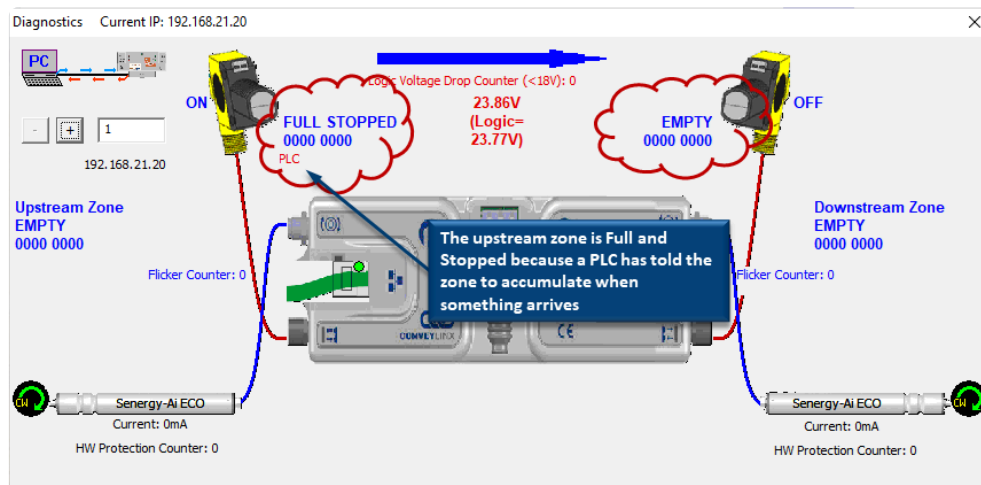
Diagnostic Window Example

Indicator	Description
1	You can navigate to the next or previous module's Diagnostic Window by clicking the + and – buttons
2	Displays the current ZPA status of the zone and the state of the sensor
3	Displays the status of the upstream and downstream zones to the selected module. Note that the values depicted below the text ("00 00" in the example) indicate the contents of the Tracking Registers.
4	Displays the current input voltage to the module as well as the count of the number of times the power supply went below 18 volts but did not completely shut off. This is useful for diagnosing possible power supply issues
5	Displays the current state of each Sensor Port input signals
6	Displays current status of each motor. Please note that this data is also shown on the main screen as well

Accumulation Status

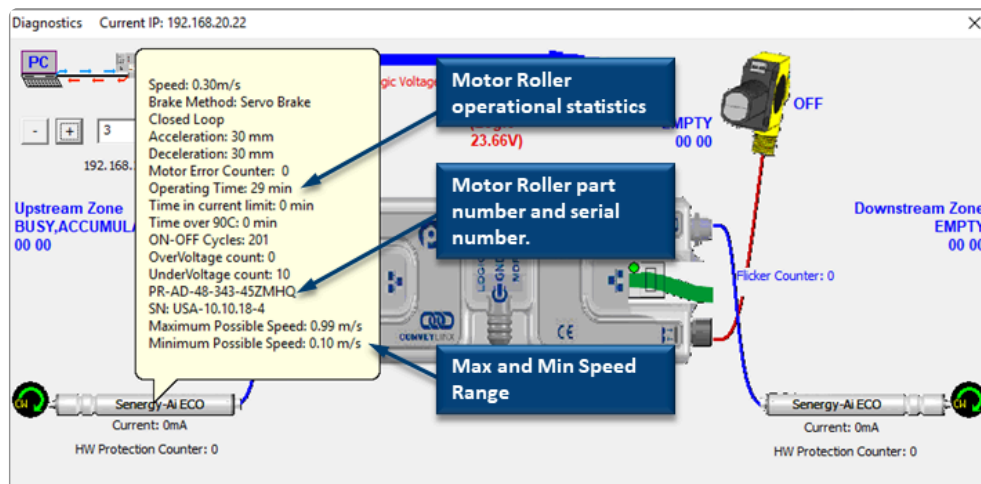
If a carton is accumulated on a particular zone, the Diagnostic Window will indicate a reason for the accumulated state. Also note that in situations where an external device (PLC or PC controller) or the *Accumulate* icon on the Main Screen has been activated; the Sensor LED on the module for the stopped carton's zone will be fast blinking green. You can then consult the Diagnostic Window for more detailed information on the exact reason

As shown in this example, for the upstream zone on the selected Module, it shows "PLC" as the reason a carton is stopped at this zone even though its immediate downstream zone is empty



Motor Roller Information

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



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7.2. Advanced Dialog

The Advanced Dialog is where you can make further changes to module operation and access utilities to help maintain your system of modules.

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



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7.2.1. Look Ahead and Timing Tab

The Look Ahead and Timing Tab contains 4 sections of settings pertaining to ZPA functionality:

[Look Ahead](#)

[Jam & Auto Clear Timers](#)

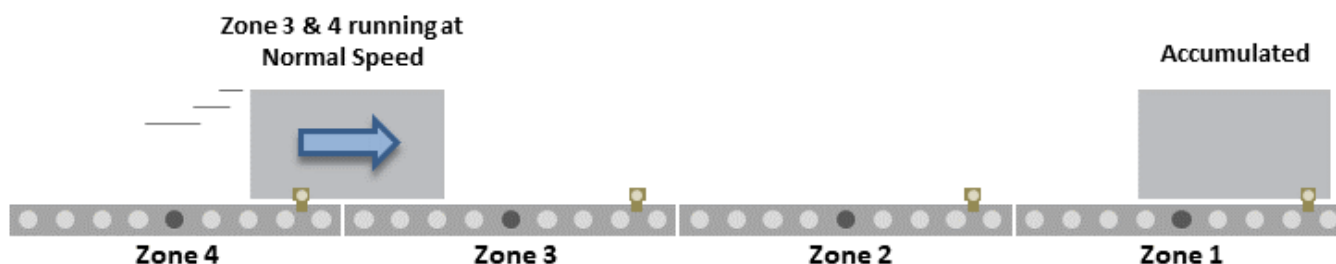
[Run After & Induct](#)

[Sensor Debounce](#)

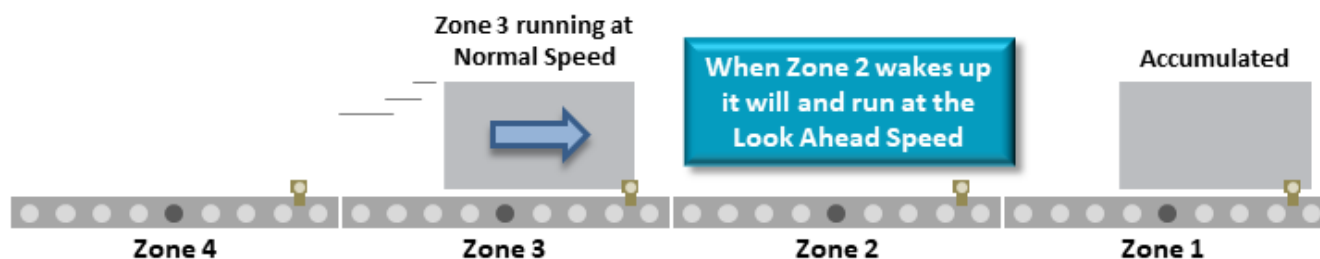
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7.2.1.1. Look Ahead Slowdown Feature

The **Look Ahead** feature configures the 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 is intended to 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.

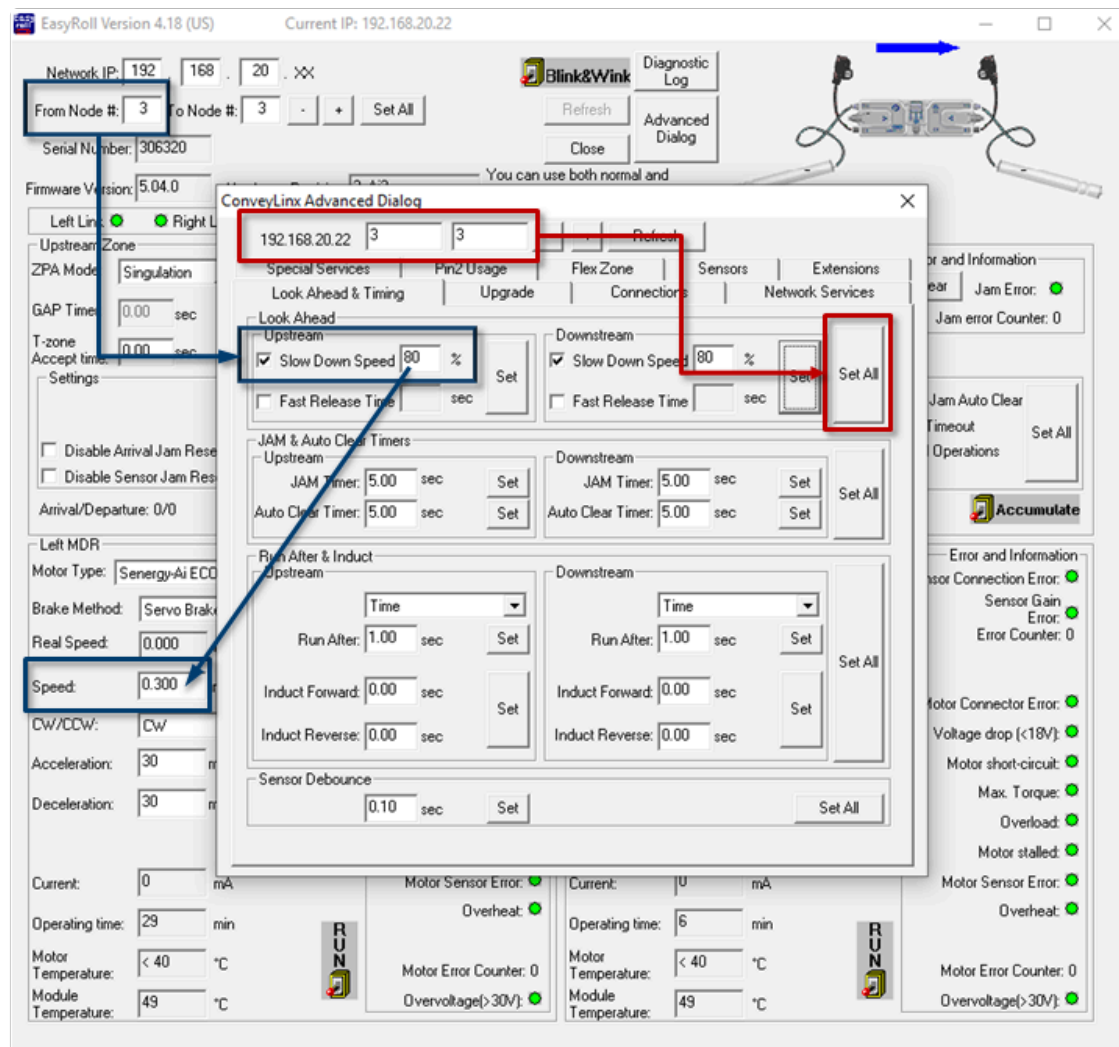


A carton is accumulated and stopped at Zone 1 and another carton is conveying at normal set speed



When carton reaches end of Zone 3, Zone 2 will wake up and run at the Look Ahead Speed

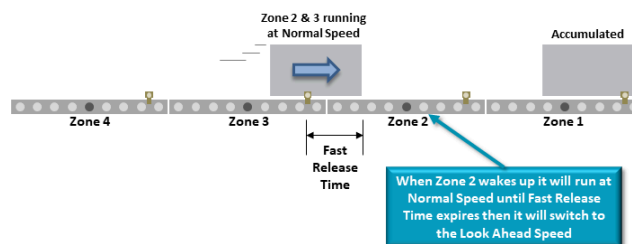
Click the checkbox to enable the **Look Ahead** feature for the selected Node. Clicking the **Set** buttons will download the setting to the respective zone on the selected Node. The value entered for the **Slow Down Speed** is in percent of the Zone's normal speed as set on the main screen. In this example, the **Slow Down Speed** speed will be proportional to 80% of 0.300 m/s. Also note there is a **Set All** button that will apply the settings to the range of Nodes entered



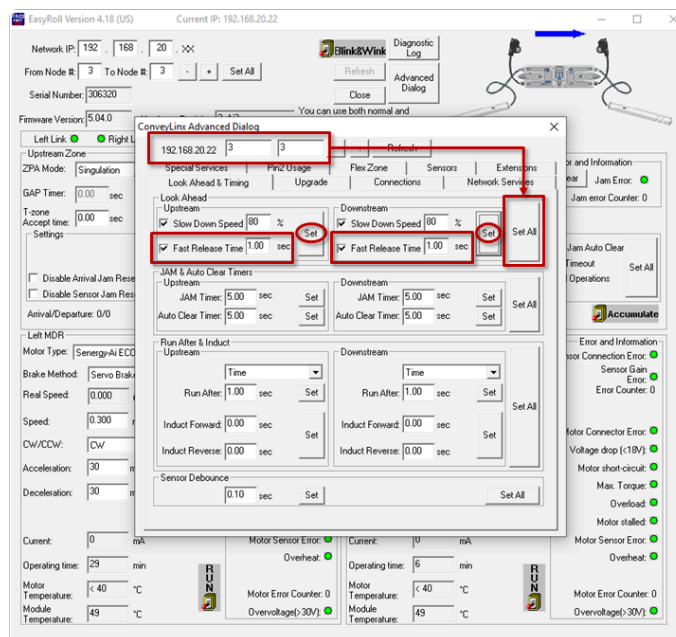
Fast Release Time

The **Fast Release Time** option allows you to set a delay before the **Slow Down Speed** is engaged for the slow-down zone

When Zone 2 wakes up it will run at normal set speed until the **Fast Release Time** has expired, then it will switch to run at the **Slow Down Speed**



To use the **Fast Release Time** option, click the **Fast Release Time** checkbox and enter a time value (in seconds) into the entry box. In this example we entered 0.5 seconds. Click **Set** to write the changes to the module and use the **Set All** feature as desired



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7.2.1.2. 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](#). 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

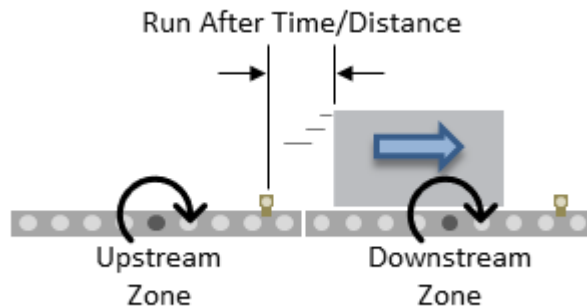
The screenshot shows the 'ConveyLinx Advanced Dialog' window. At the top, there are fields for IP address (192.168.20.22), a port number (3), and a module count (4), with a 'Refresh' button. Below this is a tabbed interface with tabs for 'Special Services', 'Pin2 Usage', 'Flex Zone', 'Sensors', 'Extensions', 'Look Ahead & Timing', 'Upgrade', 'Connections', and 'Network Services'. The 'Look Ahead & Timing' tab is active. It contains sections for 'Look Ahead' (Upstream and Downstream) with checkboxes for 'Slow Down Speed' and 'Fast Release Time', each with a percentage or second value and a 'Set' button. The 'JAM & Auto Clear Timers' section is highlighted with a red box. It has two columns for 'Upstream' and 'Downstream'. Each column has 'JAM Timer' and 'Auto Clear Timer' fields, both set to 5.00 sec, with 'Set' buttons. A 'Set All' button is on the right. Below this is the 'Run After & Induct' section with 'Upstream' and 'Downstream' columns, each having 'Run After', 'Induct Forward', and 'Induct Reverse' fields with values and 'Set' buttons. At the bottom is the 'Sensor Debounce' section with a value of 0.10 sec and a 'Set' button. A red arrow points from the 'Refresh' button to the 'Set All' button in the 'JAM & Auto Clear Timers' section.

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7.2.1.3. Run After Time/Distance

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 can 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



* Please note that Run After does not affect throughput rate. A longer Run After time will not prevent an upstream item from entering the zone.

Run After Time

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.

In this example we changed the **Run After** time to 1.00 seconds and using the **Set All** button to update this setting in Nodes 3 thru 4

The screenshot shows the 'ConveyLinx Advanced Dialog' window. At the top, there are fields for IP address (192.168.20.22), port (3), and node range (4). Below this are tabs for 'Look Ahead & Timing', 'Pin2 Usage', 'Flex Zone', 'Sensors', 'Extensions', 'Connections', and 'Network Services'. The 'Look Ahead & Timing' tab is selected. Under 'Look Ahead', there are sections for 'Upstream' and 'Downstream' with checkboxes for 'Slow Down Speed' and 'Fast Release Time'. Below these are 'JAM & Auto Clear Timers' for 'Upstream' and 'Downstream', each with 'JAM Timer' and 'Auto Clear Timer' fields. The 'Run After & Induct' section is highlighted with a red box. It contains 'Run After' time fields for 'Upstream' and 'Downstream', both set to '1.00 sec'. There are also 'Induct Forward' and 'Induct Reverse' fields. A 'Set All' button is highlighted with a red box on the right side of the dialog. At the bottom, there is a 'Sensor Debounce' field set to '0.10 sec'.

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 millimetres instead of seconds

Select **Distance** from the drop-down box and enter new values for upstream and/or downstream **Run After** distance 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. In this example we changed the **Run After** distance to 100 mm and using the **Set All** button to update this setting in Nodes 3 thru 4.

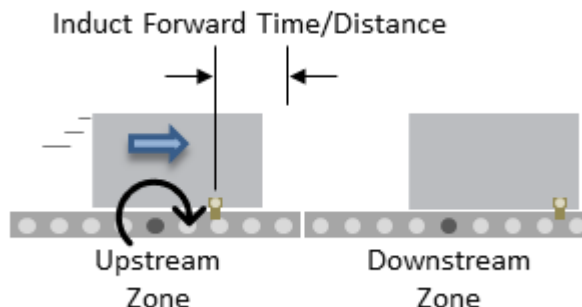
The screenshot shows the 'ConveyLinx Advanced Dialog' window. At the top, the IP address '192.168.20.22' is entered, and the node range '3' to '4' is selected. A red box highlights these fields, and a red arrow points from them to the 'Set All' button on the right. The dialog is divided into several sections: 'Look Ahead & Timing', 'JAM & Auto Clear Timers', 'Run After & Induct', and 'Sensor Debounce'. In the 'Run After & Induct' section, the 'Run After' dropdown is set to 'Distance' for both upstream and downstream. The 'Run After' value is set to '100 mm' for both. A blue callout box points to the 'mm' unit with the text 'Notice that units change to mm'. The 'Set All' button is located at the bottom right of the dialog.

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7.2.1.4. Induct Forward Time/Distance

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.

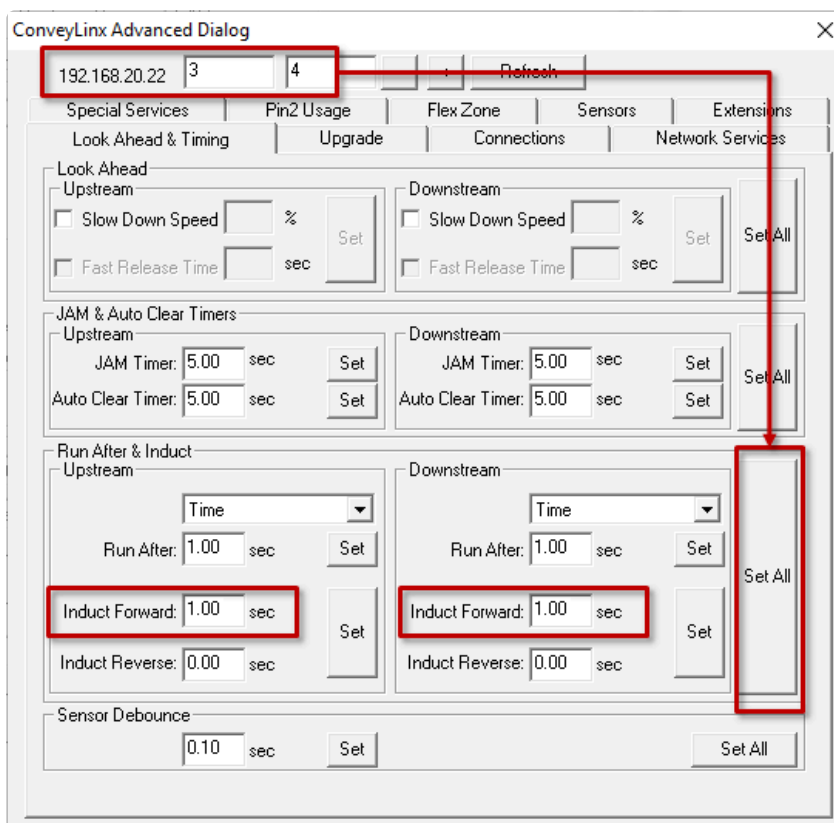
This value is adjustable per zone to compensate for special conditions when for example a zone's photo-sensor needs to be placed farther upstream from the discharge end of the zone



Induct Forward Time

Enter new values for upstream and/or downstream **Induct Forward** time and click the corresponding *Set* button. The default is 0 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.

In this example we are changing the **Induct Forward** time to 1.00 seconds for both the upstream and downstream zones and updating this setting to Nodes 3 thru 4



Induct Forward Distance

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 pulses. The **Set All** button will apply these same settings for the range of modules indicated at the top of the dialog.

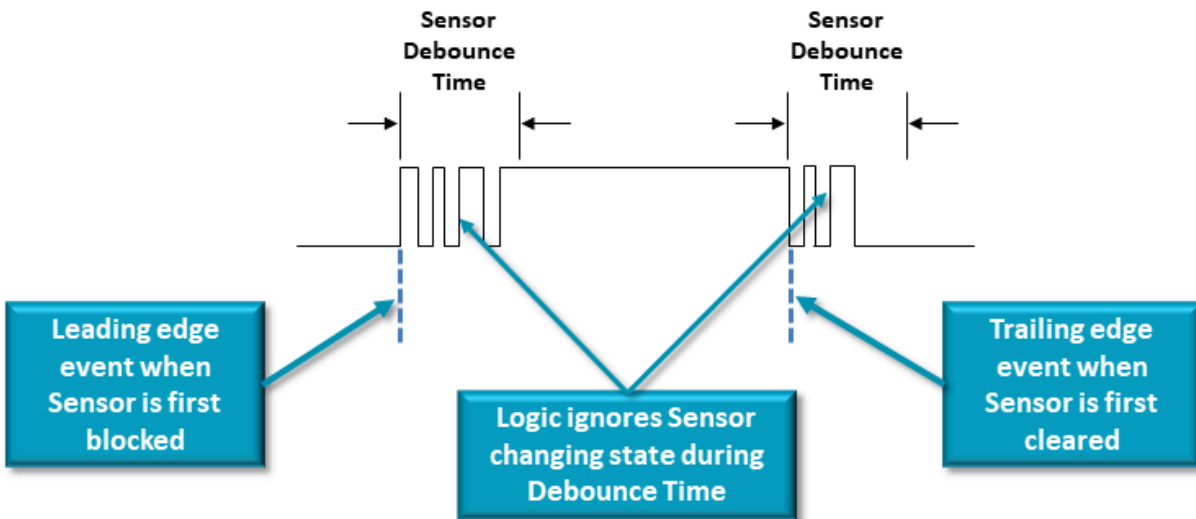
In this example we are changing the **Induct Forward** distance to 100 mm for both the upstream and downstream zones and updating this setting to Nodes 3 thru 4

The screenshot shows the 'ConveyLinX Advanced Dialog' window. At the top, the IP address '192.168.20.22' and node range '3' to '4' are highlighted with a red box. Below this, the 'Look Ahead & Timing' tab is selected. The 'Upstream' and 'Downstream' sections are visible. In the 'Upstream' section, the 'Induct Forward' value is set to '100 mm' and is highlighted with a red box. In the 'Downstream' section, the 'Induct Forward' value is also set to '100 mm' and is highlighted with a red box. A red arrow points from the 'Set All' button in the 'Look Ahead & Timing' section to the 'Set All' button in the 'Run After & Induct' section. The 'Run After & Induct' section also shows 'Induct Forward' values of '100 mm' for both upstream and downstream, which are also highlighted with red boxes. The 'Sensor Debounce' section at the bottom shows a value of '0.10 sec'.

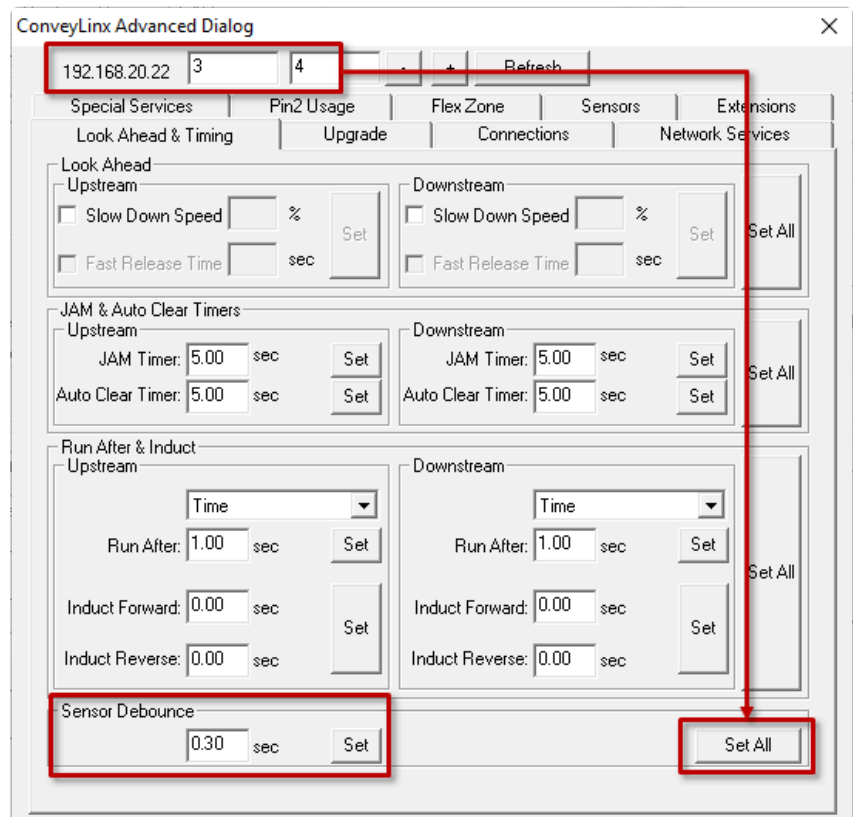
Last modified: Aug 18, 2020

7.2.1.5. 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 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. In this example we are changing the **Sensor Debounce** time to 0.30 seconds and updating this setting using the **Set All** button for Nodes 3 thru 4.



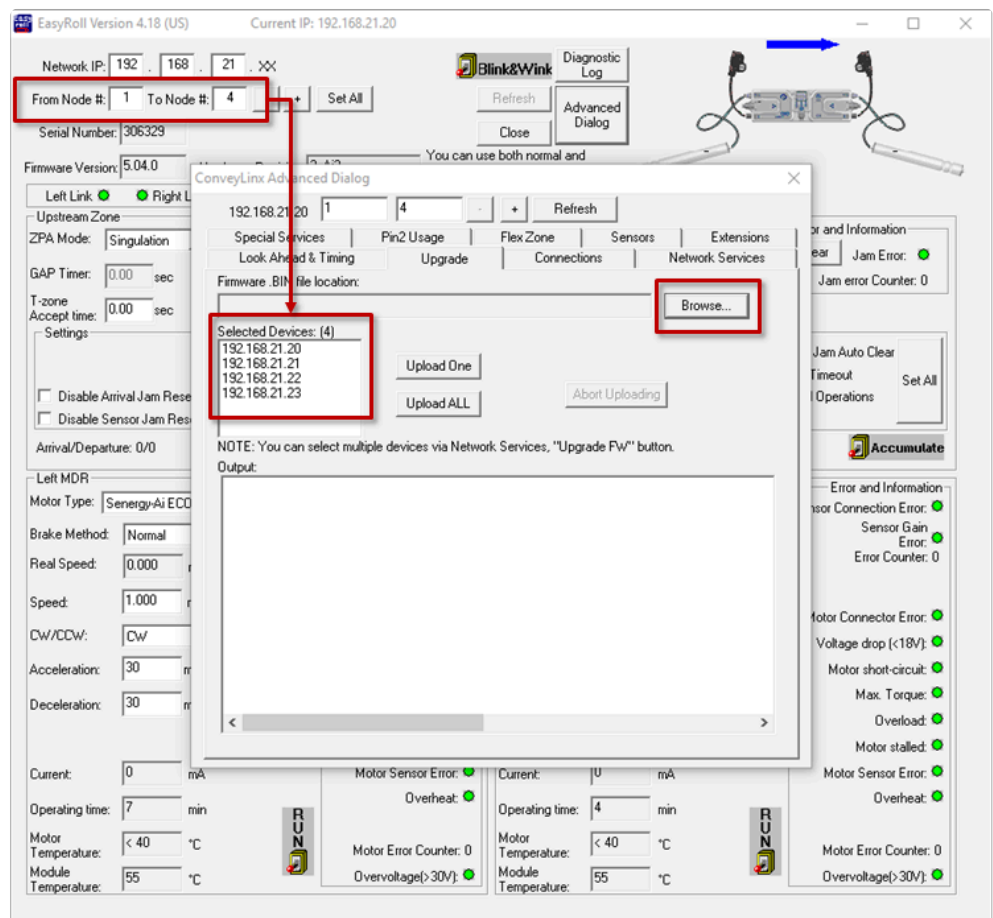
Last modified: Aug 18, 2020

7.2.2. Upgrade Tab

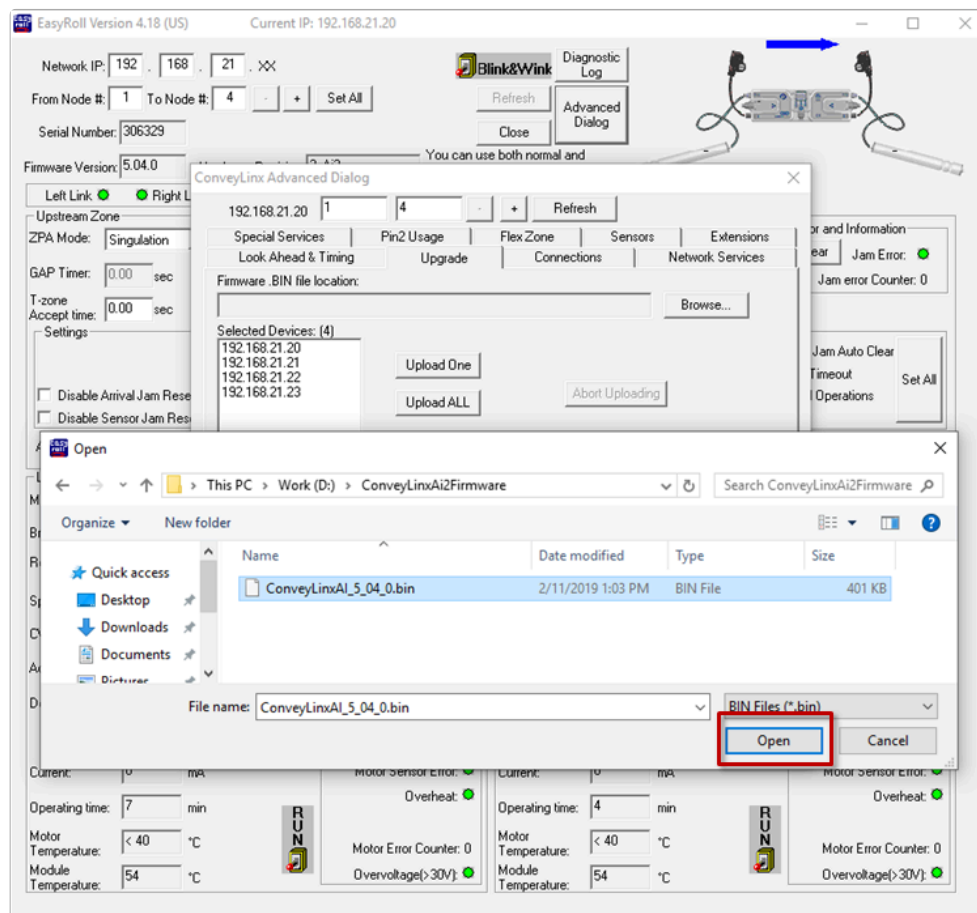
The **Upgrade** tab screen gives access to the module firmware utility. Over time, enhancements and features may be added to the ConveyLinx family of products. These features and enhancements are typically made available to customers in the form of firmware upgrade files that need to be uploaded to your modules. These files are available for download from our website. Once you have downloaded the desired file, the Upgrade utility allows you to browse for it and then select a single Node or group of Nodes to upload

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

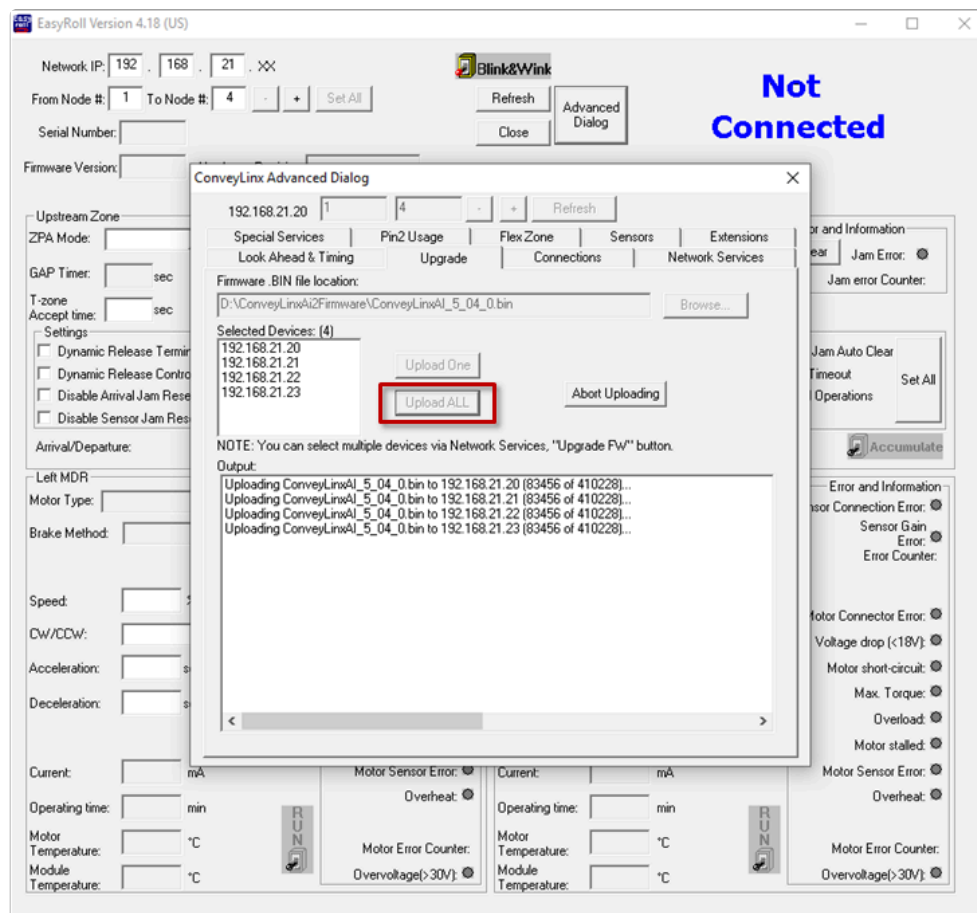
Upon selecting the **Upgrade** screen tab, *EasyRoll* fills in the I.P. address of the range of Nodes entered on the main screen. Click the **Browse** button to open a file selection dialog window



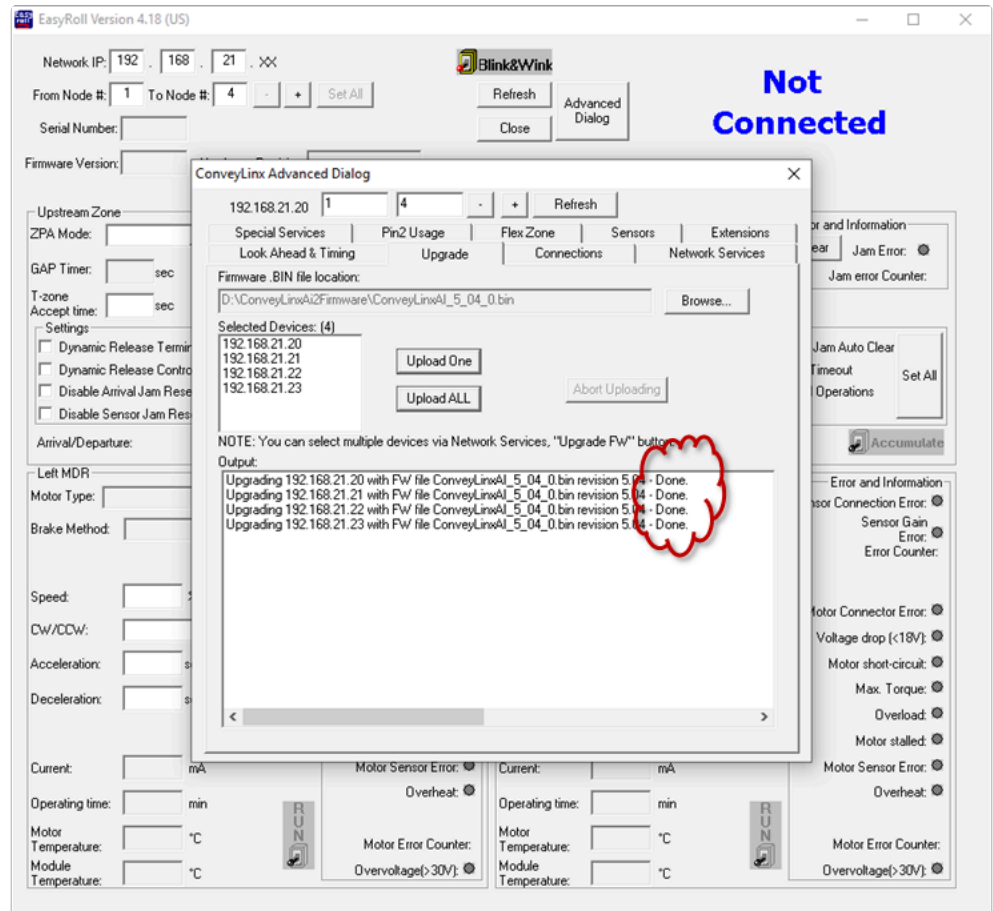
With the *Open* dialog displayed, navigate to the location on your PC where you placed the firmware upgrade file you received. Select the file and click *Open*



In this example, we clicked *Upload ALL* so the selected firmware upgrade file will be sent to all 6 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 you typically arrive at the **Upgrade** tab from the **Network Services** tab where you select the modules first and click the **Upgrade** button there. That will automatically take you to the **Upgrade** tab and populate the **Selected Devices** list box on the **Upgrade** tab with your selection from the **Network Services** tab

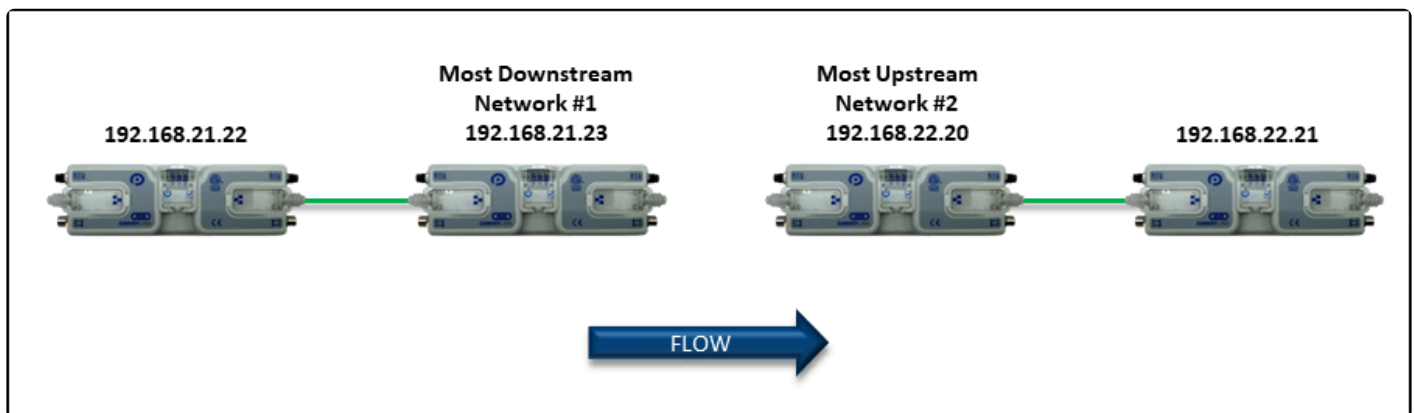
Last modified: Aug 18, 2020

7.2.3. Connections Tab

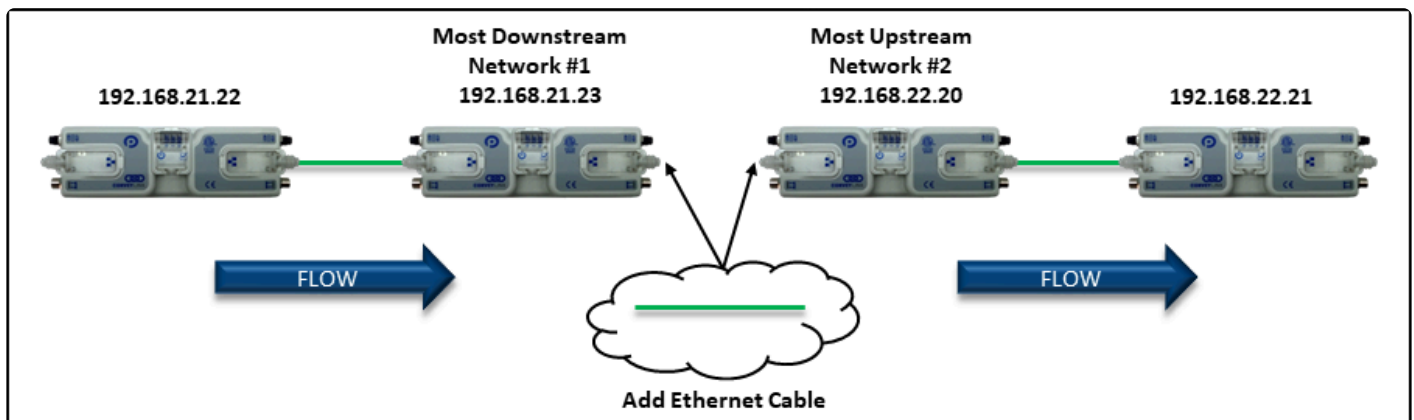
The **Connections** utility uses *EasyRoll* to instruct a given module to make a logical connection to another module that it otherwise would not have made during the *Auto-Configuration Procedure*. For applications where you have more than one *Subnet*, this would be the way to logically connect the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

Connecting Two Subnets Together

Here is 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.



By simply connecting an Ethernet cable between these two boundary Nodes and then using *EasyRoll* to establish the “logical” connection between the two *Subnets*; you can achieve seamless flow between the two networks. The procedure requires that you have to instruct Node at 192.168.21.23 to convey cartons to Node at 192.168.22.20, and likewise you have to 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. 192.168.20.25). Notice that the module's network data appears in the center. Also notice that the Downstream connection for this Node is *None*

ConveyLinX Advanced Dialog

192.168.21.23 4 + Refresh

Special Services | Pin2 Usage | Flex Zone | Sensors | Extensions
Look Ahead & Timing | Upgrade | Connections | Network Services

Node #: 4
IP Address: 192.168.21.23
Subnet Mask: 255.255.128.0

Upstream
Node #: 3
IP Address: 192.168.21.22

Downstream
Node #: None
IP Address: . . .

PLC I/O Mode
☐ PLC I/O Mode
☐ Push/Pull Type Sensor
☐ Left ☐ Right
☐ Lock PLC Mode
 ON PLC Disconnected Outputs/Motors:
 PLC Program:
☐ Delete PLC Program
☐ Clear Connections
☐ Hardware Controlled

Apply

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

ConveyLinX Advanced Dialog

192.168.21.23 4 4 + Refresh

Special Services | Pin2 Usage | Flex Zone | Sensors | Extensions
Look Ahead & Timing | Upgrade | Connections | Network Services

Node #: 4
IP Address: 192.168.21.23
Subnet Mask: 255.255.128.0

Upstream
Node #: 3
IP Address: 192.168.21.22

Downstream
Node #: None
IP Address: 192.168.22.20

PLC I/O Mode
☐ PLC I/O Mode
☐ Push/Pull Type Sensor
☐ Left ☐ Right
☐ Lock PLC Mode
 ON PLC Disconnected Outputs/Motors:
 PLC Program:
☐ Delete PLC Program
☐ Clear Connections
☐ Hardware Controlled

Apply

Navigate to Node 1 of the 192.168.22 subnet (i.e. 192.168.22.20). Notice that the module's network data appears in the center. Also notice that the Upstream connection for this Node is *None*

ConveyLinX Advanced Dialog

192.168.22.20 1 + Refresh

Special Services Pin2 Usage Flex Zone Sensors Extensions
Look Ahead & Timing Upgrade Connections Network Services

Node #: 1
IP Address: 192.168.22.20
Subnet Mask: 255.255.128.0

Upstream
☒ Node #
None
☐ IP Address

Downstream
☒ Node #
2
☐ IP Address
192.168.22.21

PLC I/O Mode
☐ PLC I/O Mode
Push/Pull Type Sensor
☐ Left ☐ Right
☐ Lock PLC Mode
ON PLC Disconnected
Outputs/Motors:
PLC Program:
☐ Delete PLC Program
☐ Clear Connections
☐ Hardware Controlled

Apply

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

ConveyLinX Advanced Dialog

192.168.22.20 1 4 + Refresh

Special Services Pin2 Usage Flex Zone Sensors Extensions
Look Ahead & Timing Upgrade Connections Network Services

Node #: 1
IP Address: 192.168.22.20
Subnet Mask: 255.255.128.0

Upstream
☐ Node #
None
☒ IP Address
192.168.21.23

Downstream
☒ Node #
2
☐ IP Address
192.168.22.21

PLC I/O Mode
☐ PLC I/O Mode
Push/Pull Type Sensor
☐ Left ☐ Right
☐ Lock PLC Mode
ON PLC Disconnected
Outputs/Motors:
PLC Program:
☐ Delete PLC Program
☐ Clear Connections
☐ Hardware Controlled

Apply

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7.2.4. Network Services Tab

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

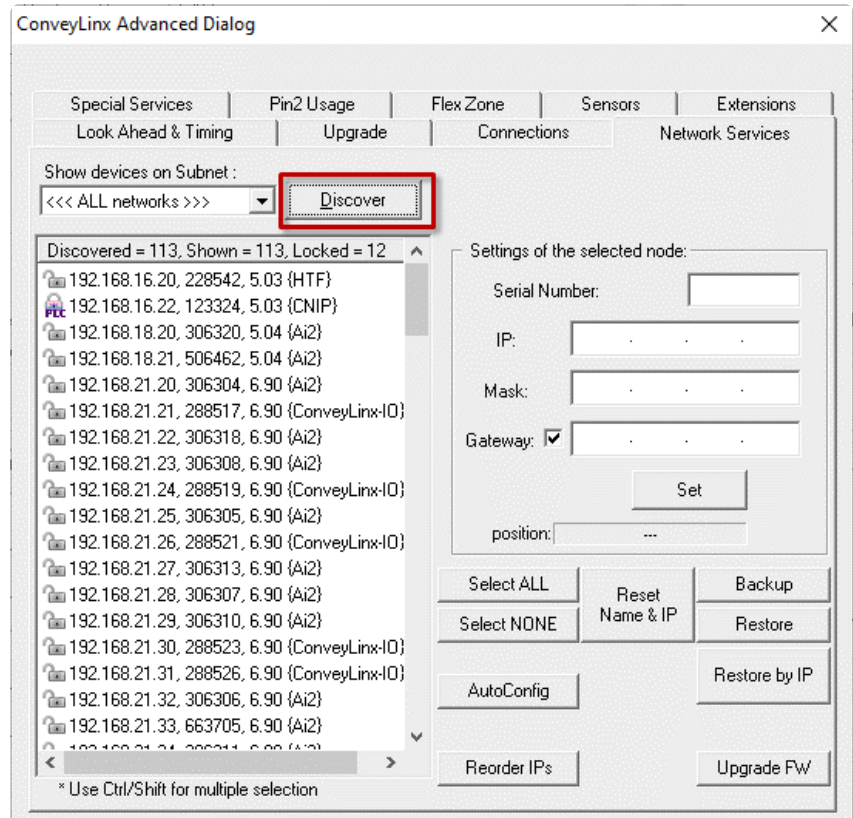
- [Discover and IP Address Set](#)
- [Backup and Restore](#)
- [Firmware Upgrade](#)

Last modified: Aug 04, 2020

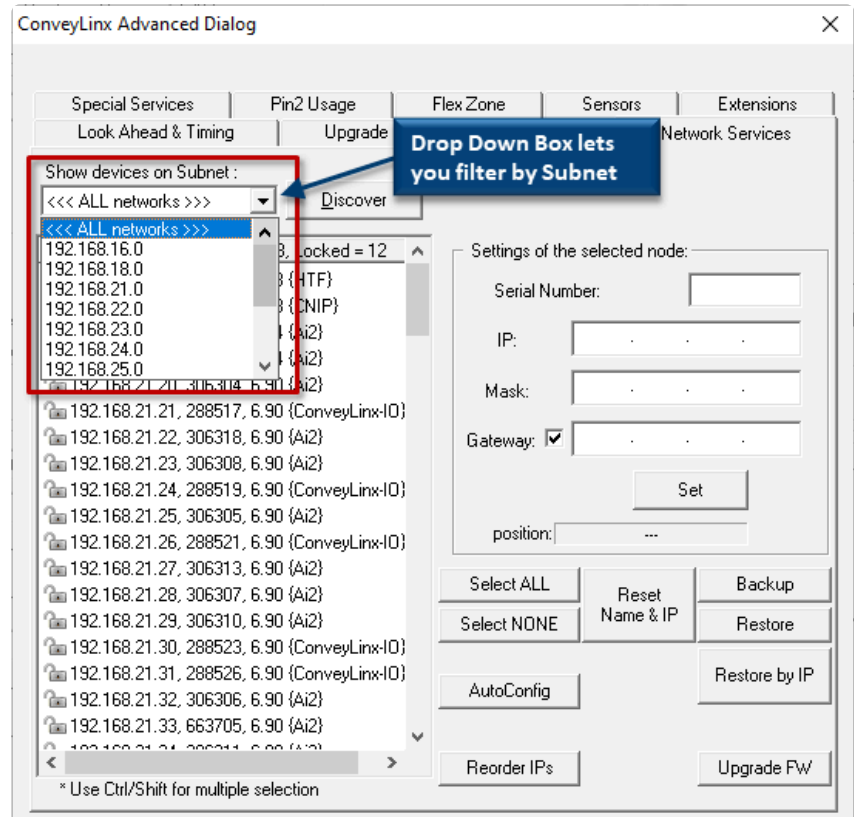
7.2.4.1. Discover & IP Address Set

One of the features of *EasyRoll* is that it has a utility called **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

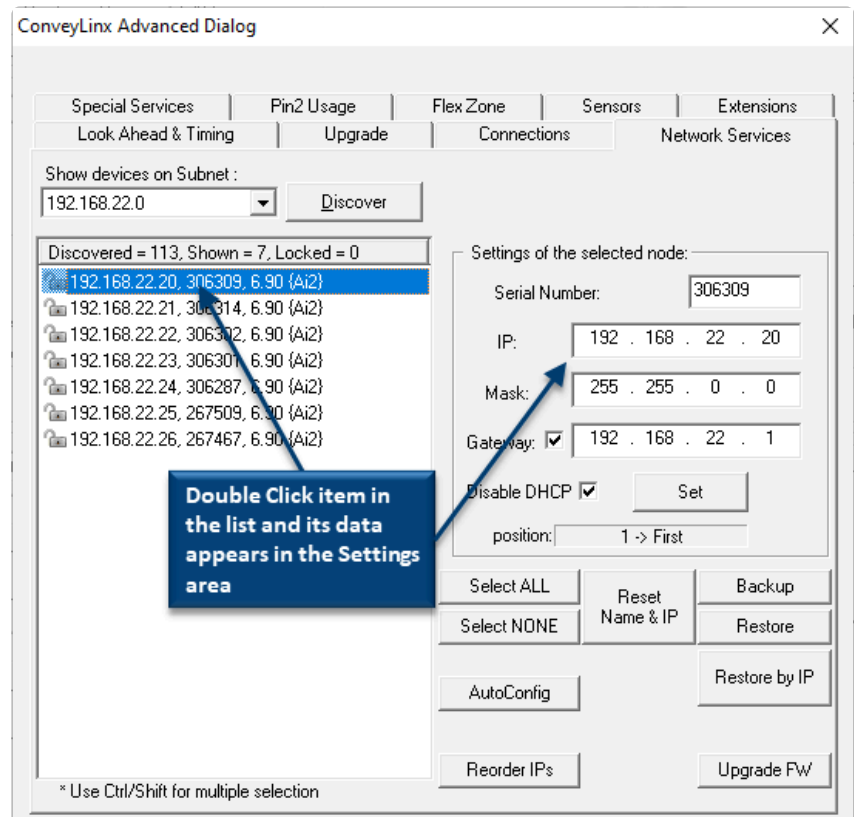
Clicking the **Discover** button will cause the list box to populate with all the modules in all **Subnets** that your PC can see out on the network



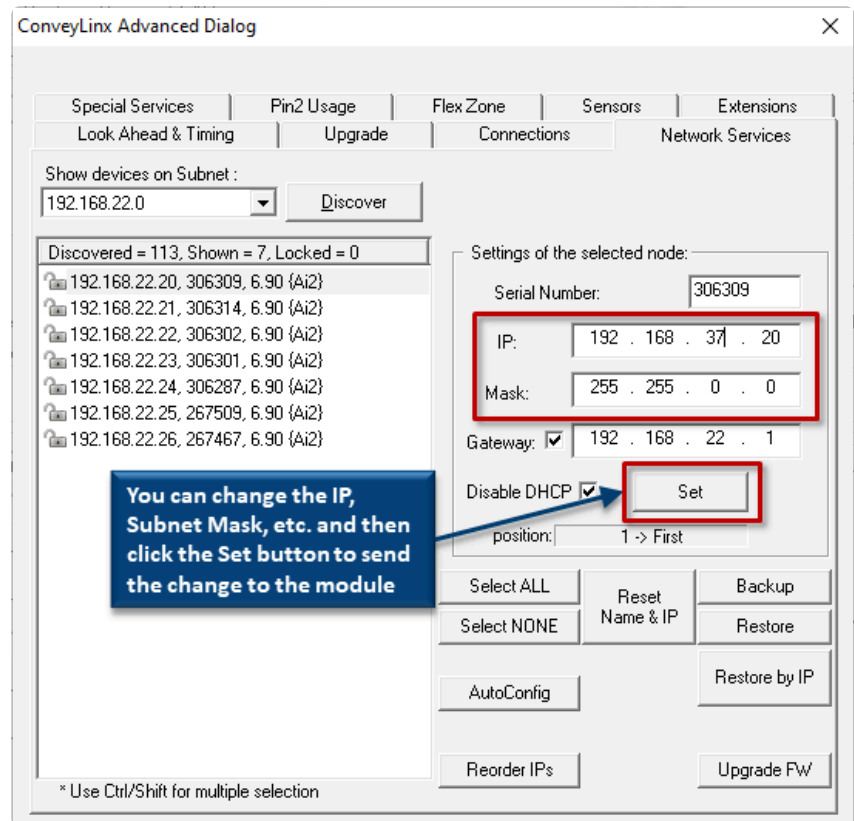
The drop-down box at the top of the list box lets you filter the list by **Subnet**



To change the IP Address, Subnet Mask, etc. of a module, double click it from the list and its data can be modified



Once you have edited the data, click the **Set** button and the changes are sent to the module

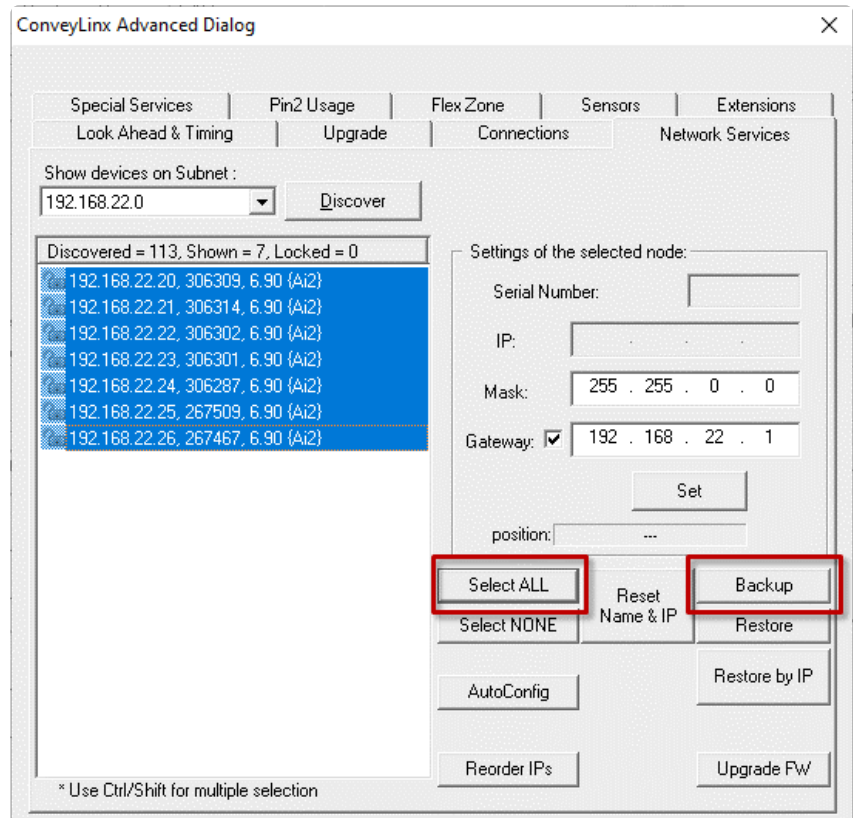


Last modified: Aug 18, 2020

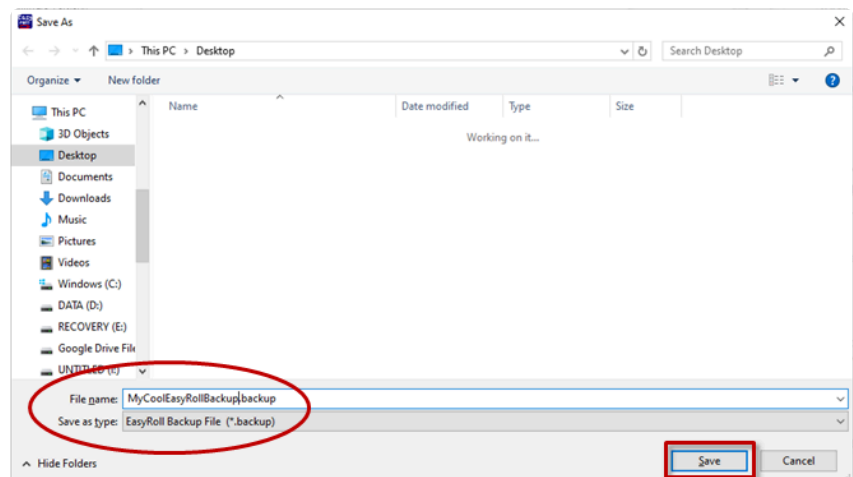
7.2.4.2. Backup & Restore

ou have the ability to 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, acceleration, deceleration, 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 modules to a previously known state

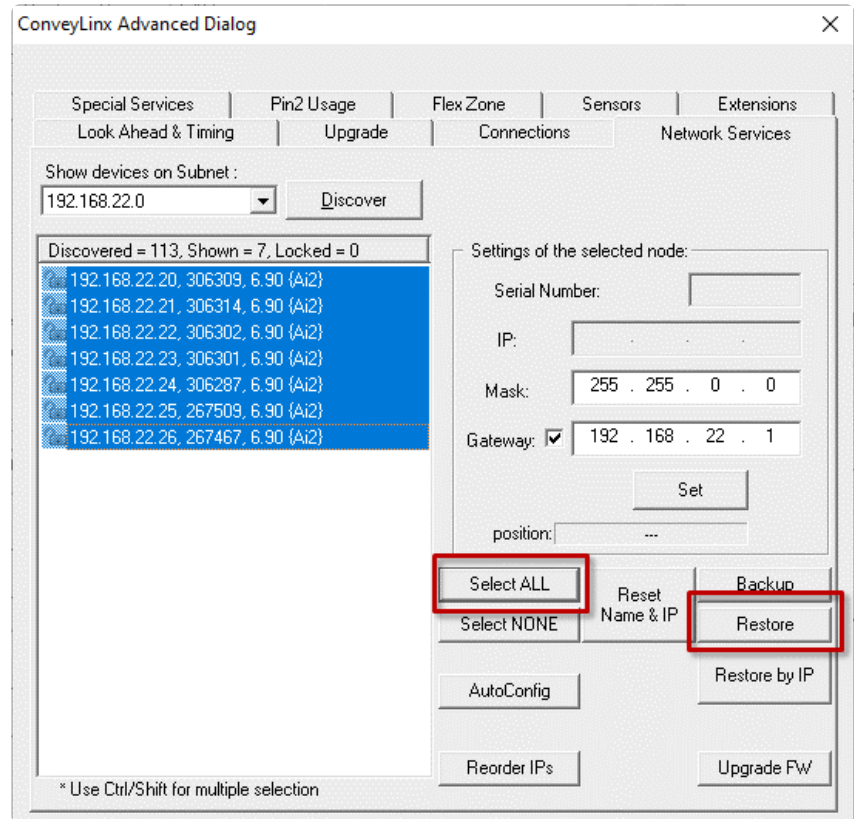
To perform a backup, click the **Select ALL** button to select all the items in the list. In this example we are going to backup **Subnet** 192.168.29. Once all modules are highlighted, click the **Backup** button.



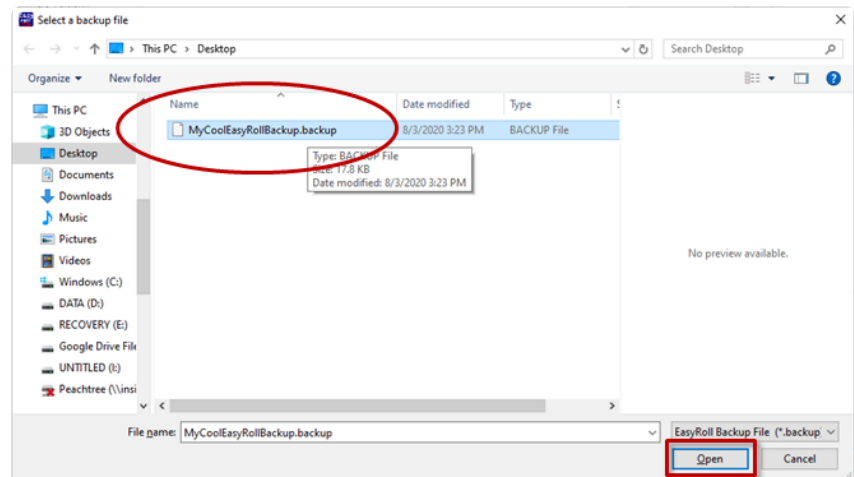
A **Save As** dialog will appear and you provide a filename and location to save the file



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, select it and click "Open".



* 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 Function

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:

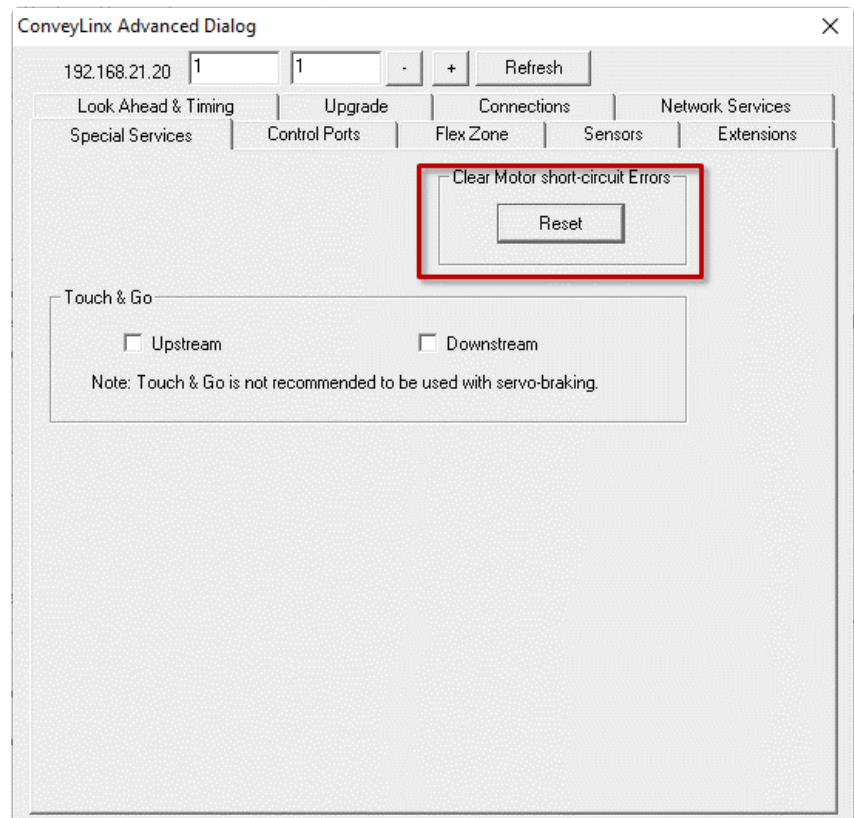
- When you perform a **Backup**; at a minimum, select all modules in a given **Subnet**
- When you perform a **Restore**; at a minimum, select all modules in a given **Subnet**
- Perform a new **Backup** after you make any settings changes to one or more modules in a **Subnet**
- Perform a new **Backup**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

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7.2.5. Special Services Tab

Clear Motor Short Circuit Error

Another function on the *Special Services* tab is a button used to clear an MDR short circuit error. This particular 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 tab. This function is made available in *EasyRoll* as a convenience so you don't have to cycle the power on the module.

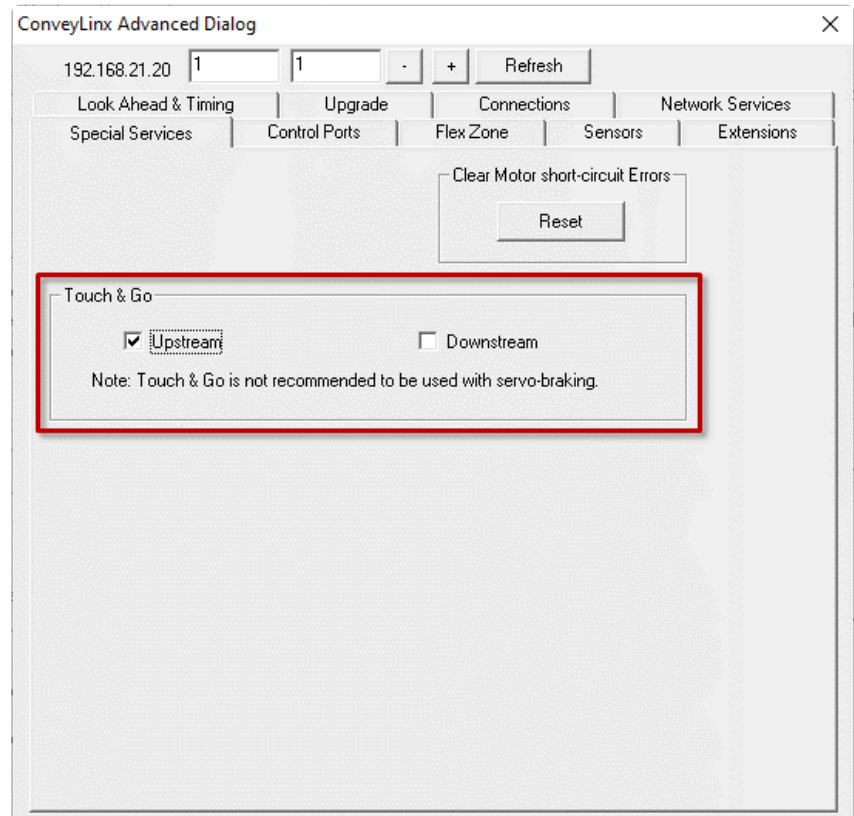


There is not a separate **Reset** button for left and right motors. One button will perform the function for either or both motors.

Touch & Go

The *Touch & Go* function is available in ZPA mode and when activated causes the MDR in the activated zone to sense rotational movement of the MDR in its default direction. If this rotational movement (such as someone pushing a carton onto the zone) is of sufficient duration and speed; the zone will “wake up” as if its upstream interlock had been energized. You enable this function by checking the appropriate Upstream or Downstream checkbox in the *Touch & Go* area.

You can set this functionality for either or both the Upstream and Downstream Zones in the direction of flow. In this example we checked the Upstream zone



Touch & Go is only applicable for ZPA mode. Do NOT use Touch & Go with Servo Braking

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7.2.6. Flex Zone Tab

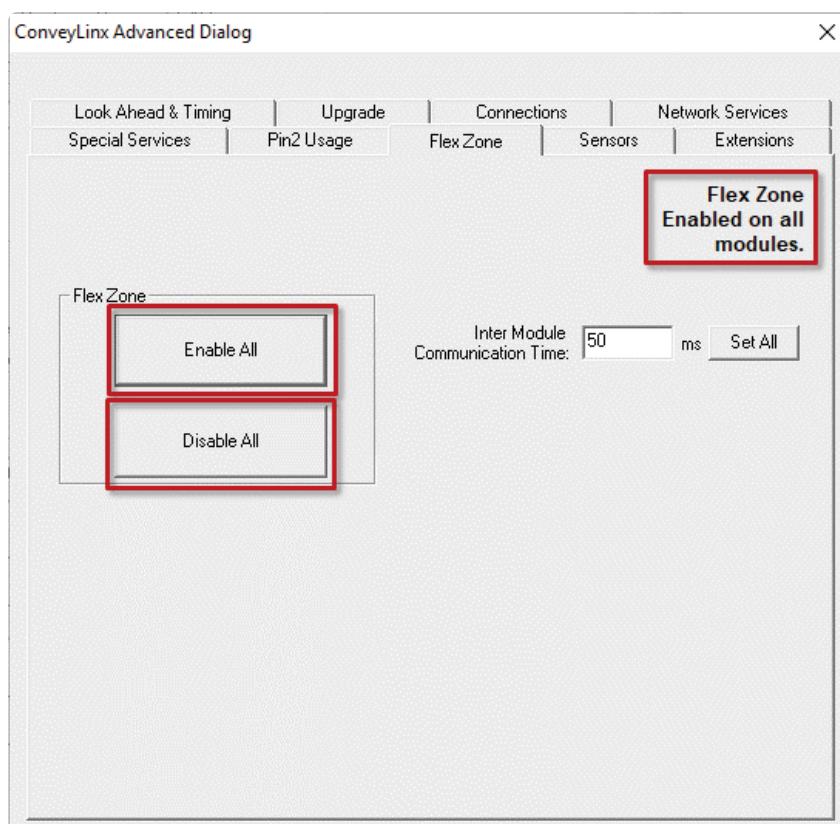
The [Flex Zone](#) feature is enabled by default when you perform the *Auto Configure Procedure*. There can be certain situations such as higher speed applications and/or applications where a large percentage of cartons are at a length very close to the zone length where a “false triggering” of a flex 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 has to be enabled or disabled for the entire subnet. It cannot be disabled or enabled on a per zone basis or for a group of zones within the same subnet.

Click the appropriate button to either **Disable** or **Enable** Flex Zone based upon the **Subnet's** current status as indicated.

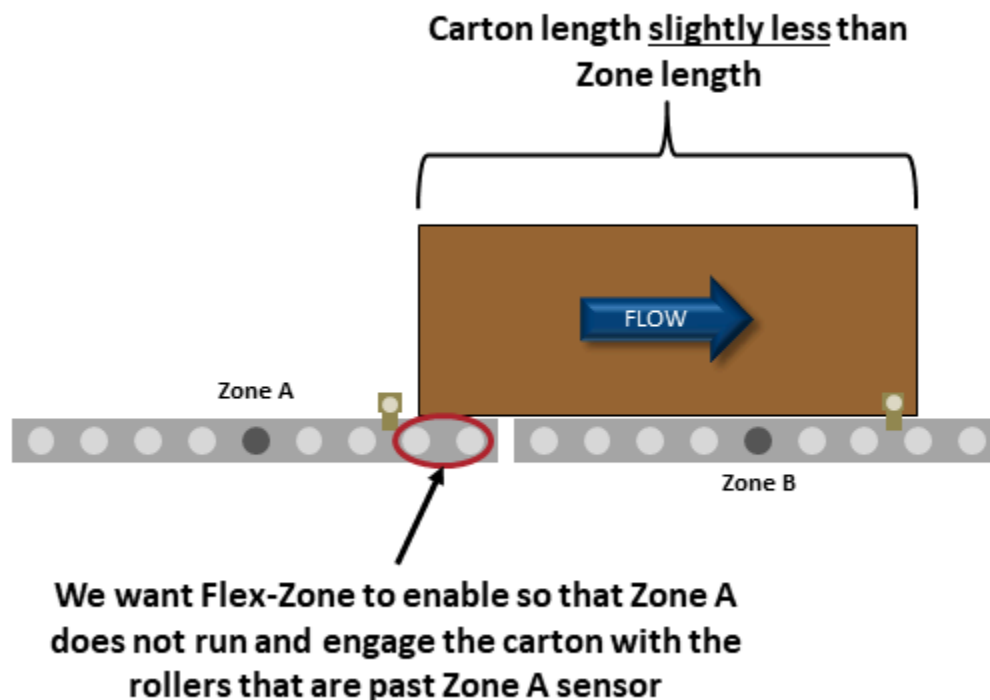
Because this function applies to all modules in the **Subnet**, it does not matter what module you were connected to when you invoked the **Advanced Dialog** in order to disable or enable **Flex Zone**



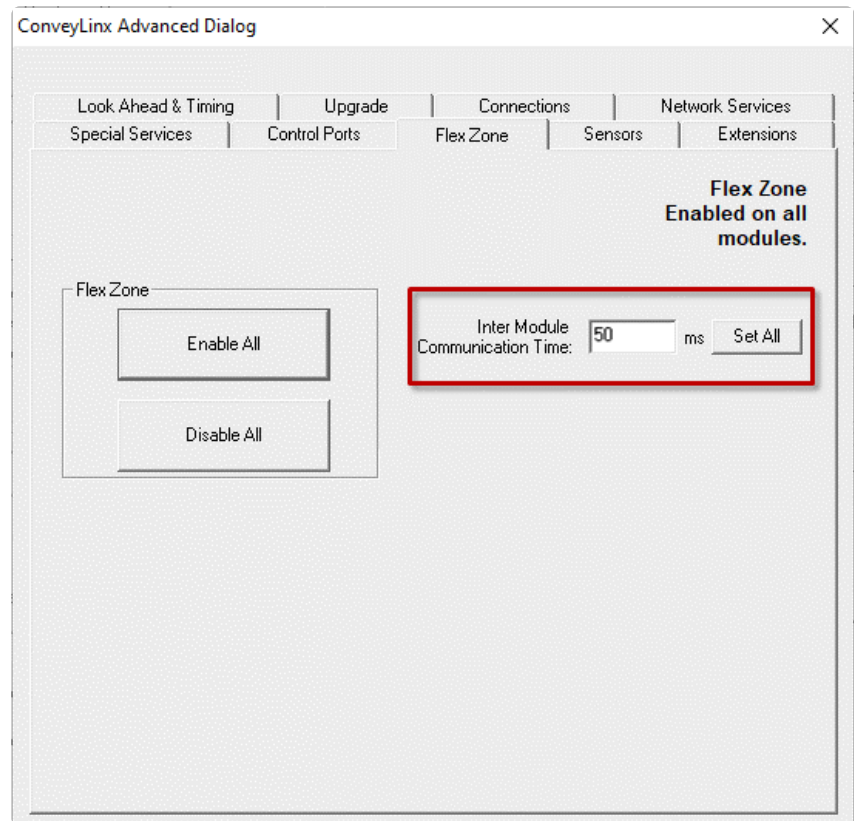
Inter Module Communication Time

The **Inter Module Communication Time** value is used to adjust the behavior of the Flex Zone operation. In situations where carton lengths can be close to the length of the zones (i.e. distance between photoeyes), you may want to adjust Flex Zone operation so that it either engages or not in these situations.

Typically there are one or two driven rollers past the sensor in a Zone. If you have cartons that encroach upon these rollers when accumulated in the downstream zone, you may want **Flex Zone** to engage so that the next upstream carton will not enter the zone (Zone A in the example), thus not running these rollers underneath the accumulated carton.



The value entered is in msec and it can be thought of as an amount of time added to the logic after the trailing edge of the sensor in order to simulate increasing the carton length. Please note that this value will be set the same for each module in the **Subnet**.



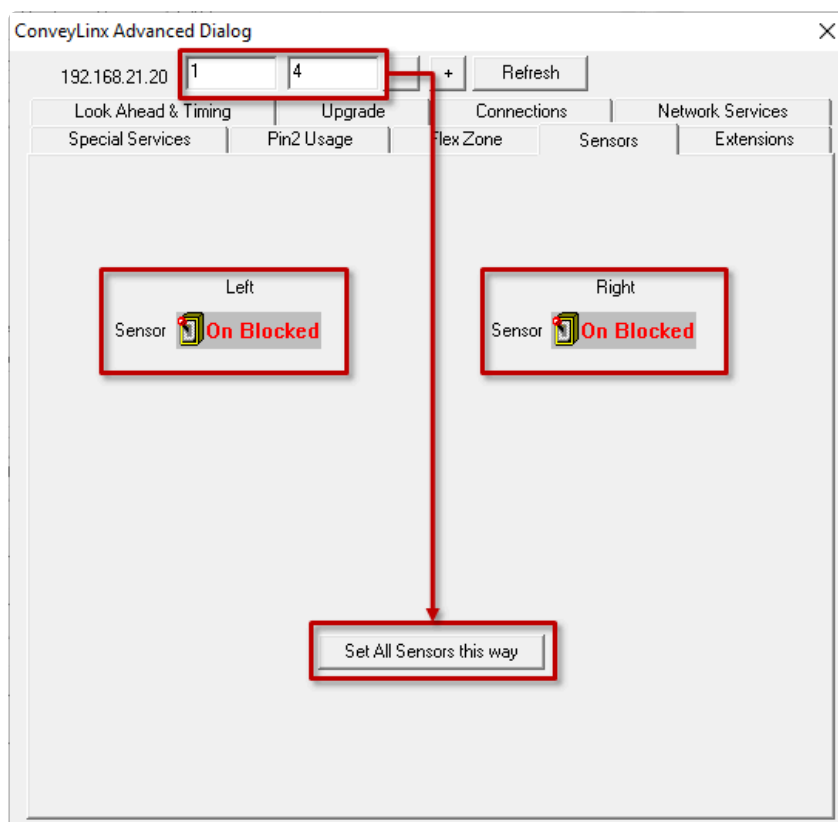
Please note this value has nothing to do with speeding up or slowing down the actual speed of communications between modules

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7.2.7. 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 either or both 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



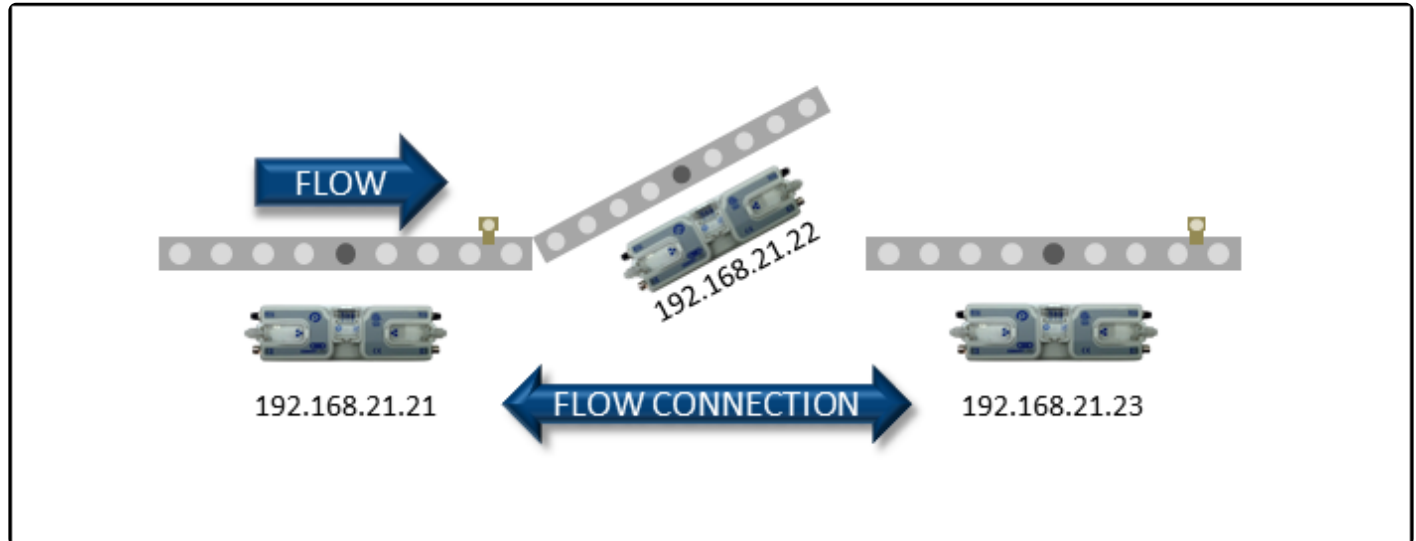
Last modified: Aug 18, 2020

7.2.8. 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.

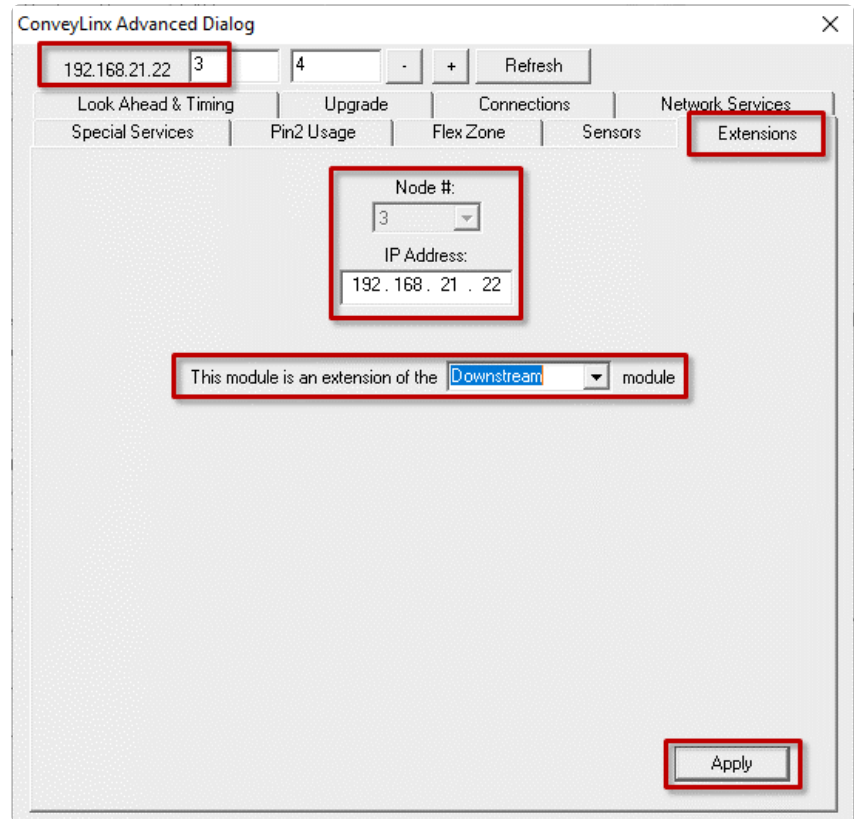
Example for Using Extensions for a Lift Gate

A common use of the Extension mode configuration available from the Connections tab selection is for a powered lift gate. In this example the module on the lifting or gate portion of conveyor has an MDR and no photo-sensors. Normal operation when the gate is down is for the MDR 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



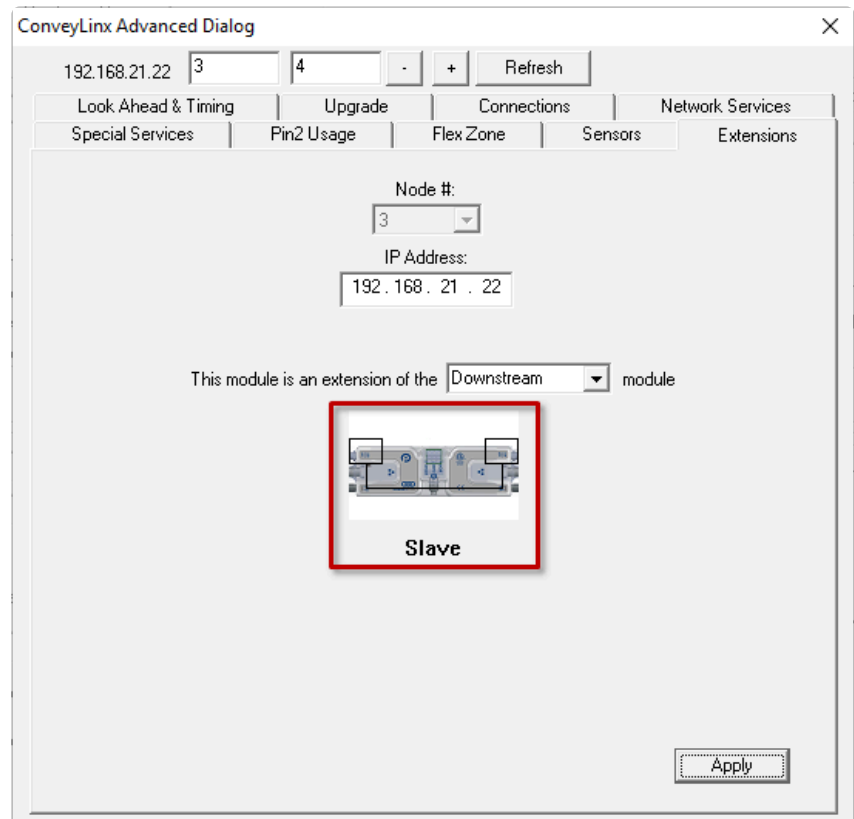
Lift Gate Example

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



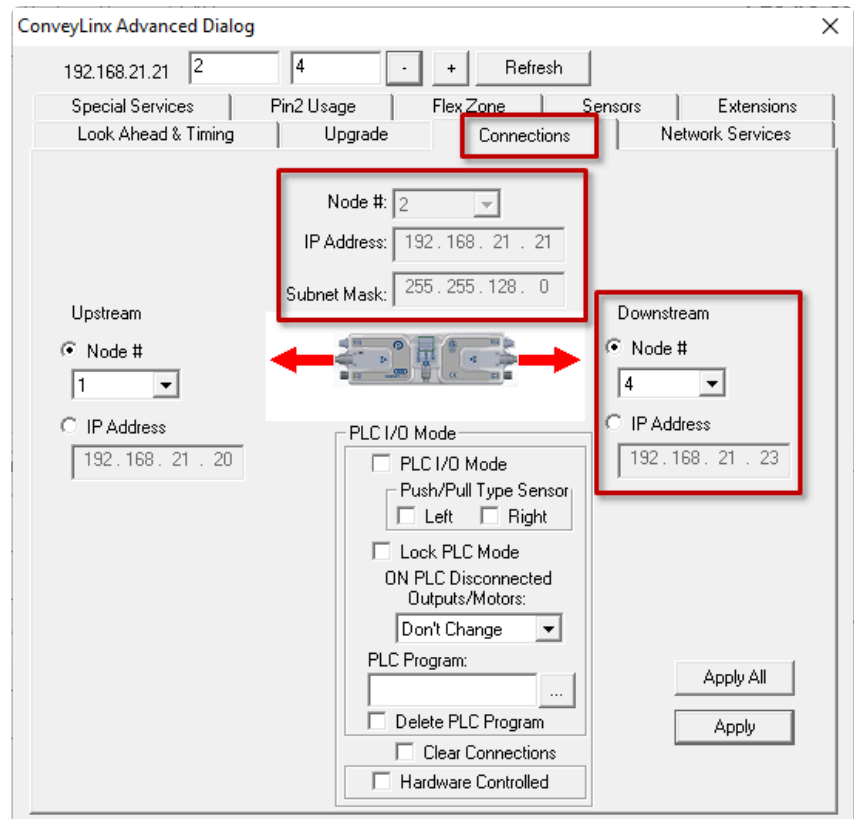
The screenshot shows the 'ConveyLinX Advanced Dialog' window. At the top, there are input fields for IP address (192.168.21.22) and Node # (3), with a 'Refresh' button. Below these are several tabs: 'Look Ahead & Timing', 'Upgrade', 'Connections', 'Network Services', 'Special Services', 'Pin2 Usage', 'Flex Zone', 'Sensors', and 'Extensions'. The 'Extensions' tab is selected. In the center, there is a 'Node #' dropdown set to 3 and an 'IP Address' field containing '192.168.21.22'. Below this, a message states 'This module is an extension of the Downstream module'. At the bottom right, there is an 'Apply' button.

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



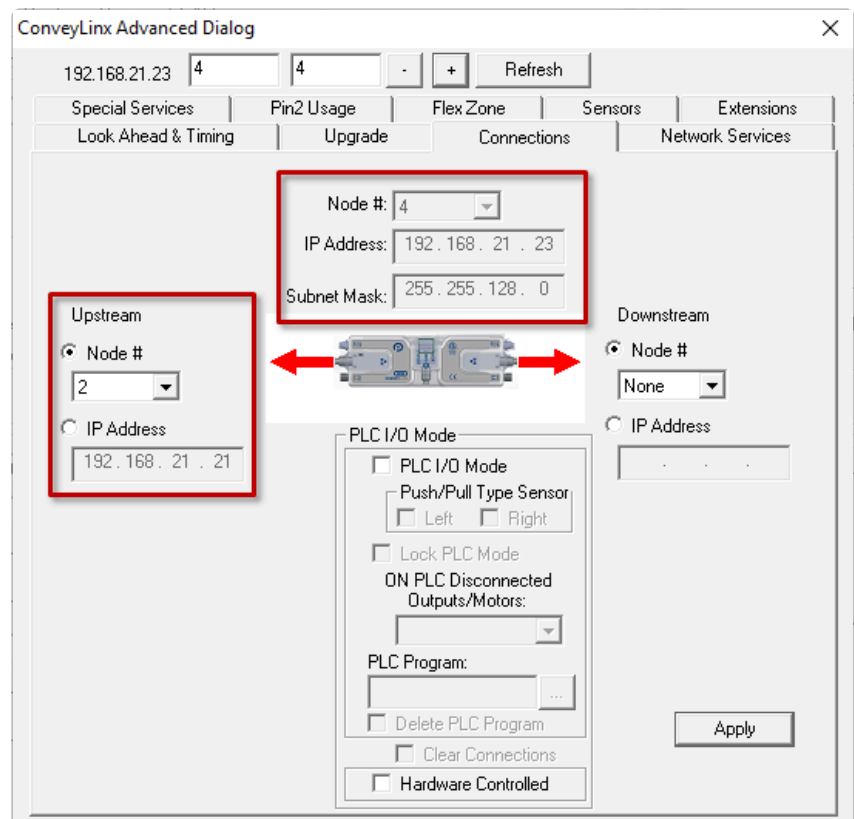
The screenshot shows the 'ConveyLinX Advanced Dialog' window after the configuration. The 'Extensions' tab is still selected. The 'Node #' dropdown is set to 3, and the 'IP Address' field contains '192.168.21.22'. Below this, the message 'This module is an extension of the Downstream module' is displayed. A diagram of a conveyor system is shown, with the selected module highlighted in red and labeled 'Slave'. At the bottom right, there is an 'Apply' button.

Now if 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**



The screenshot shows the 'ConveyLinX Advanced Dialog' window with the 'Connections' tab selected. The 'Node #' dropdown is set to 2. The IP Address is 192.168.21.21 and the Subnet Mask is 255.255.128.0. The 'Upstream' section shows 'Node #' set to 1 and 'IP Address' set to 192.168.21.20. The 'Downstream' section shows 'Node #' set to 4 and 'IP Address' set to 192.168.21.23. A red box highlights the 'Node #' dropdown in the 'Downstream' section. The 'PLC I/O Mode' section is also visible, with options for 'PLC I/O Mode', 'Push/Pull Type Sensor', 'Lock PLC Mode', and 'ON PLC Disconnected Outputs/Motors'.

And then when you navigate to **Node 4**, you can see that its upstream connection is now **Node 2** instead of **Node 3**



The screenshot shows the 'ConveyLinX Advanced Dialog' window with the 'Connections' tab selected. The 'Node #' dropdown is set to 4. The IP Address is 192.168.21.23 and the Subnet Mask is 255.255.128.0. The 'Upstream' section shows 'Node #' set to 2 and 'IP Address' set to 192.168.21.21. The 'Downstream' section shows 'Node #' set to 'None' and 'IP Address' set to '. . .'. A red box highlights the 'Node #' dropdown in the 'Upstream' section. The 'PLC I/O Mode' section is also visible, with options for 'PLC I/O Mode', 'Push/Pull Type Sensor', 'Lock PLC Mode', and 'ON PLC Disconnected Outputs/Motors'.

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

ConveyLinX Advanced Dialog

192.168.21.22 3 4 . + Refresh

Special Services	Pin2 Usage	Flex Zone	Sensors	Extensions
Look Ahead & Timing	Upgrade	Connections	Network Services	

Node #: 3

IP Address: 192.168.21.22

Subnet Mask: 255.255.128.0

Left Master

☒ Node #

None

☐ IP Address

Right Master

☒ Node #

4

☐ IP Address

192.168.21.23

Push/Pull Type Sensor

☐ Left ☐ Right

Apply

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7.2.9. Pin 2 Usage Tab

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:

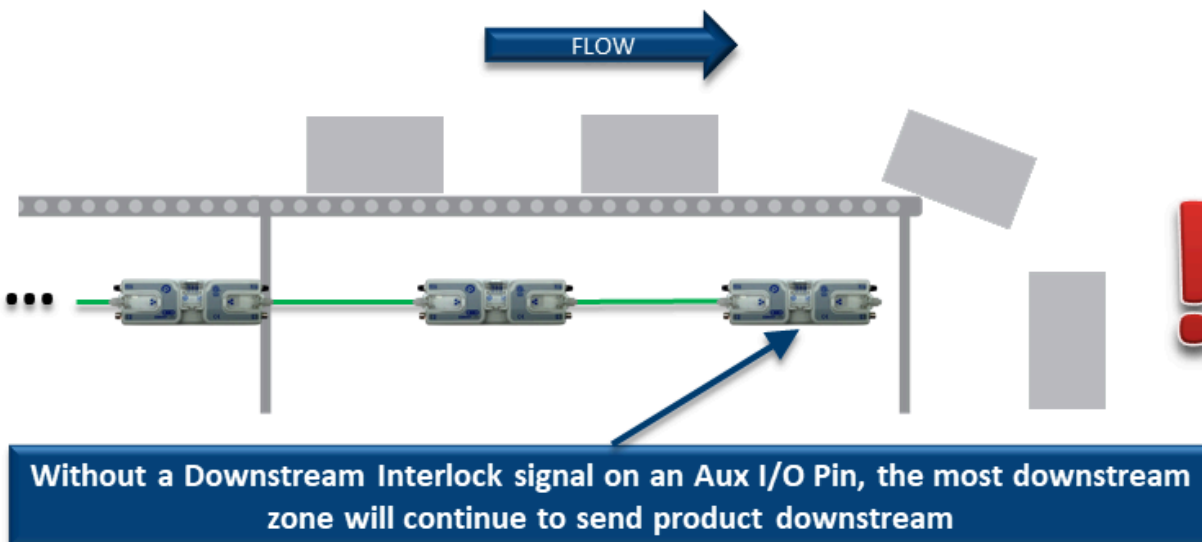
- None: No ZPA Function but is available to be read as input by remote PLC
- Accumulate: Input for local zone accumulate command
- Wake up: Input for local zone wake-up signal
- Wake-up with Timeout
- Lane Full Interface: Input for local Lane Full Interface signal
- Module Error Output
- Product on Zone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

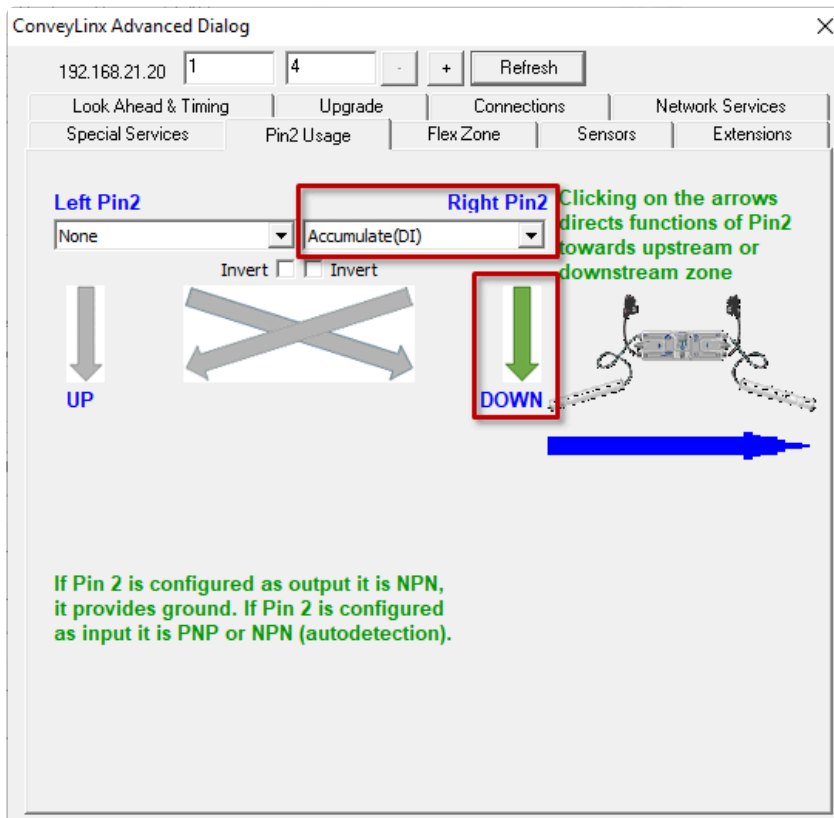
Last modified: Aug 04, 2020

7.2.9.1. 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.

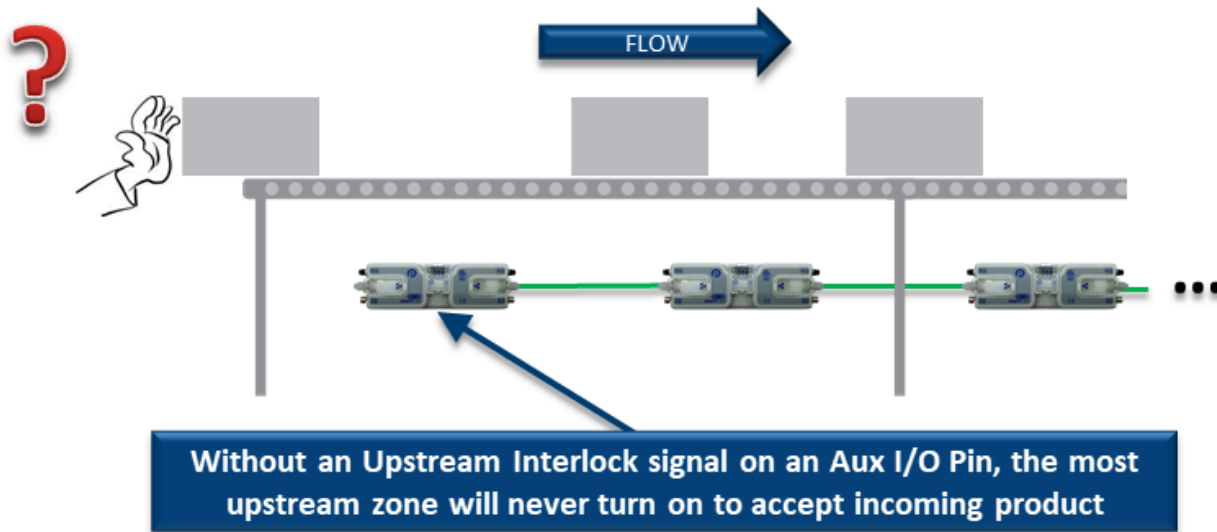


Assuming the most downstream zone is connected to the right side of the module; we set the Right Aux I/O Pin 2 to **Accumulate** from the drop-down box and make sure we click the "DOWN" arrow to indicate that the Right Pin 2 signal is to be associated with the Downstream Zone. When the Right Pin 2 signal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

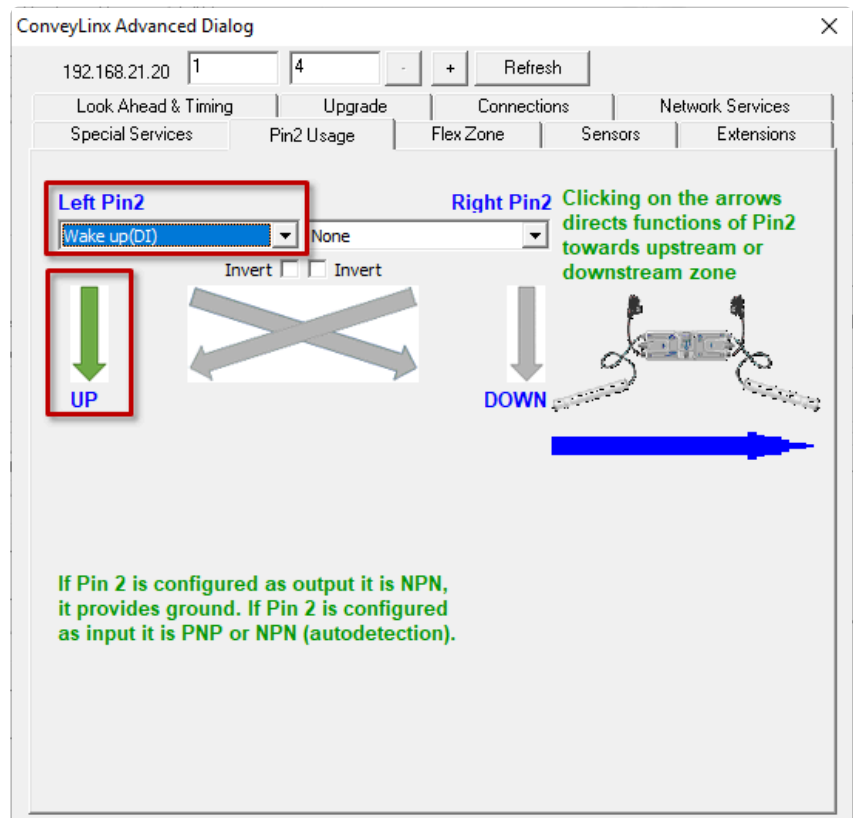


7.2.9.2. Most Upstream Zone

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.



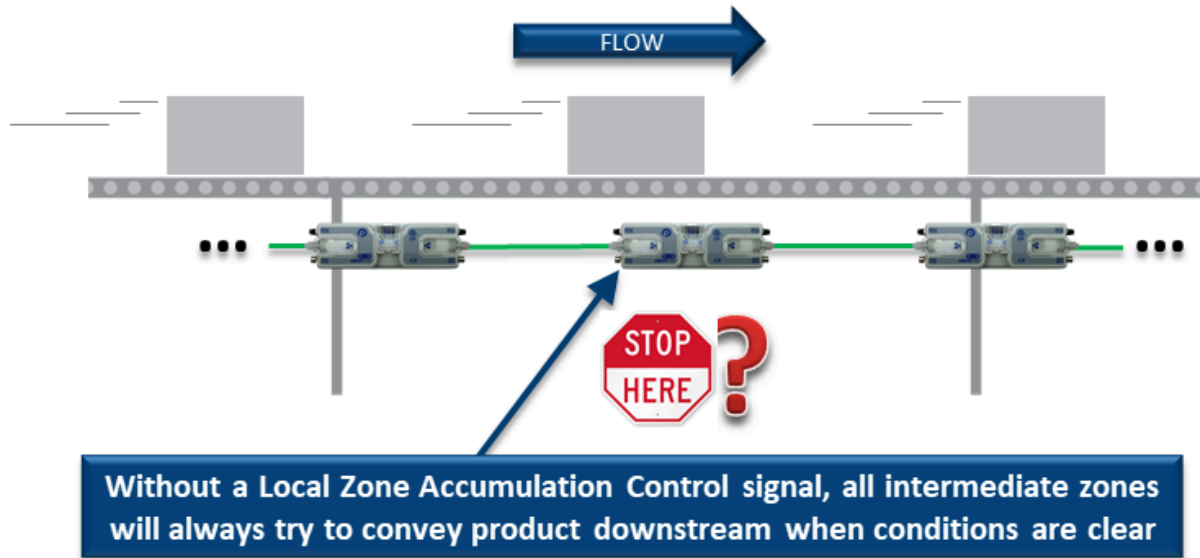
Assuming the most upstream zone is connected to the left side of the module; we set the Left Pin 2 to **Wake up** from the drop-down box and make sure we click the UP arrow to indicate that the Left Pin 2 signal is to be associated with the Upstream Zone. When the Left Pin 2 signal is energized, the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



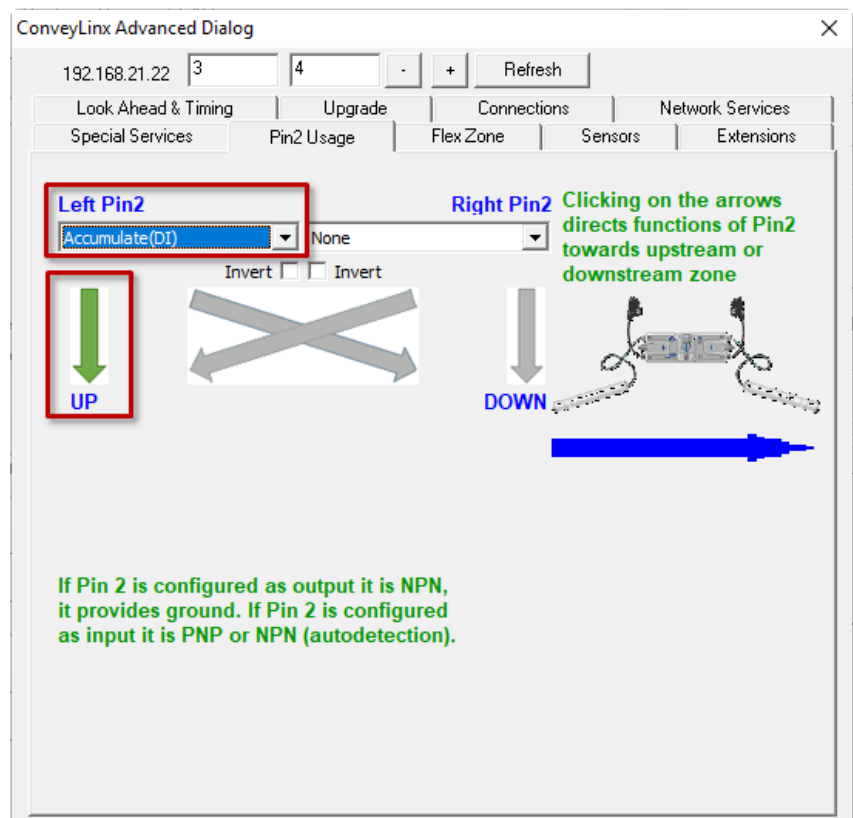
Last modified: Aug 18, 2020

7.2.9.3. 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

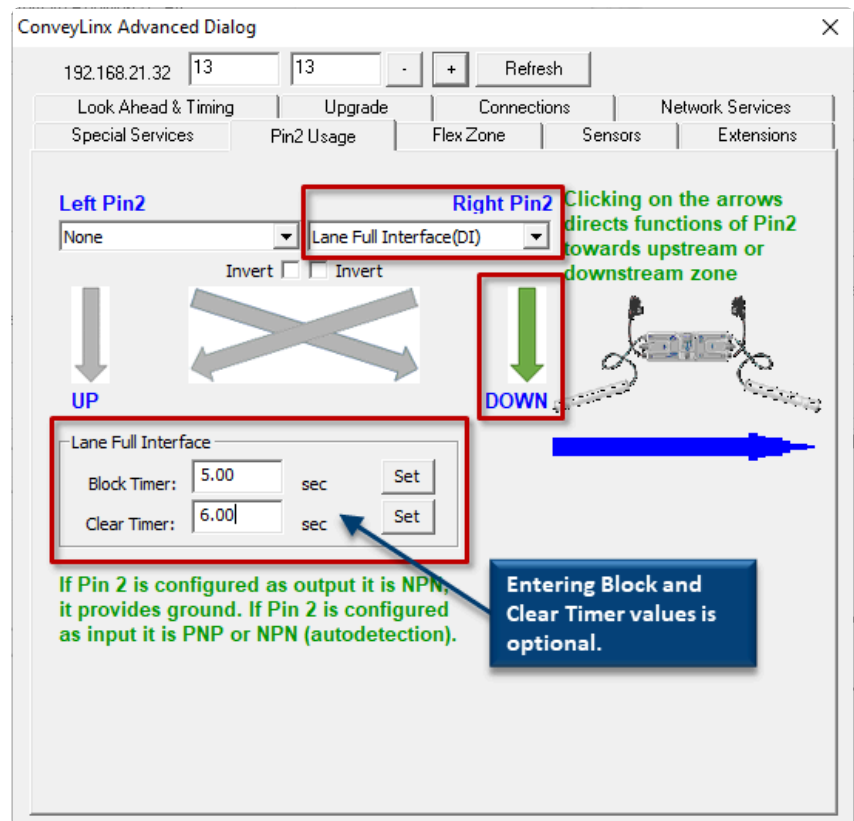


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7.2.9.4. Lane Full Interface

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 off (and the clear 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 “DOWN” 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. In this example, we entered 5 seconds for the Block Time and 6 seconds for the Clear Time

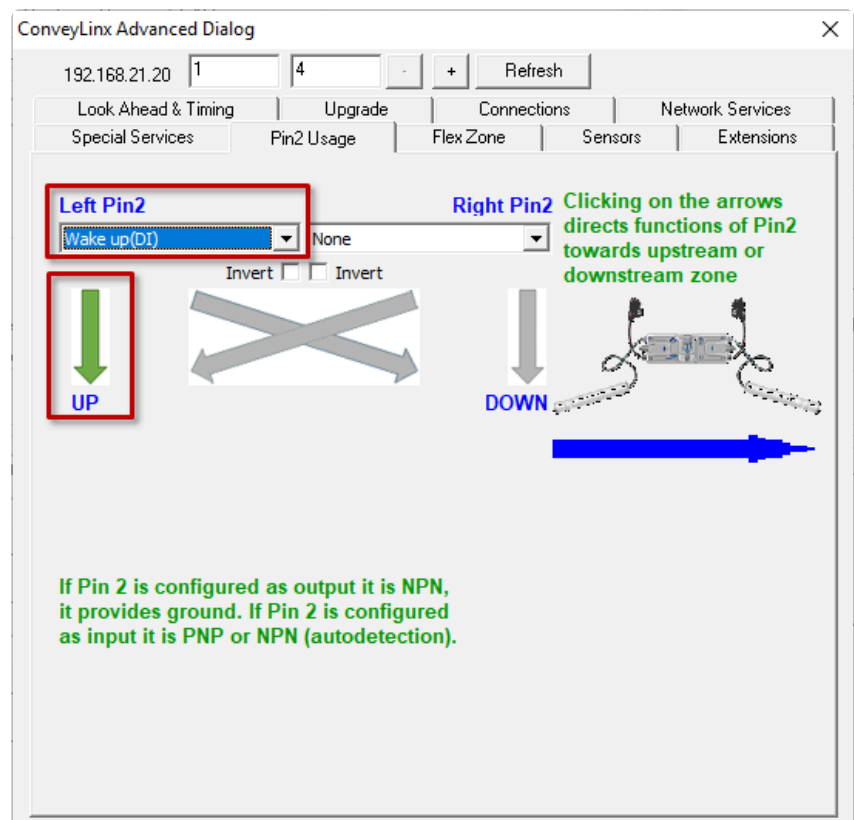


Last modified: Aug 18, 2020

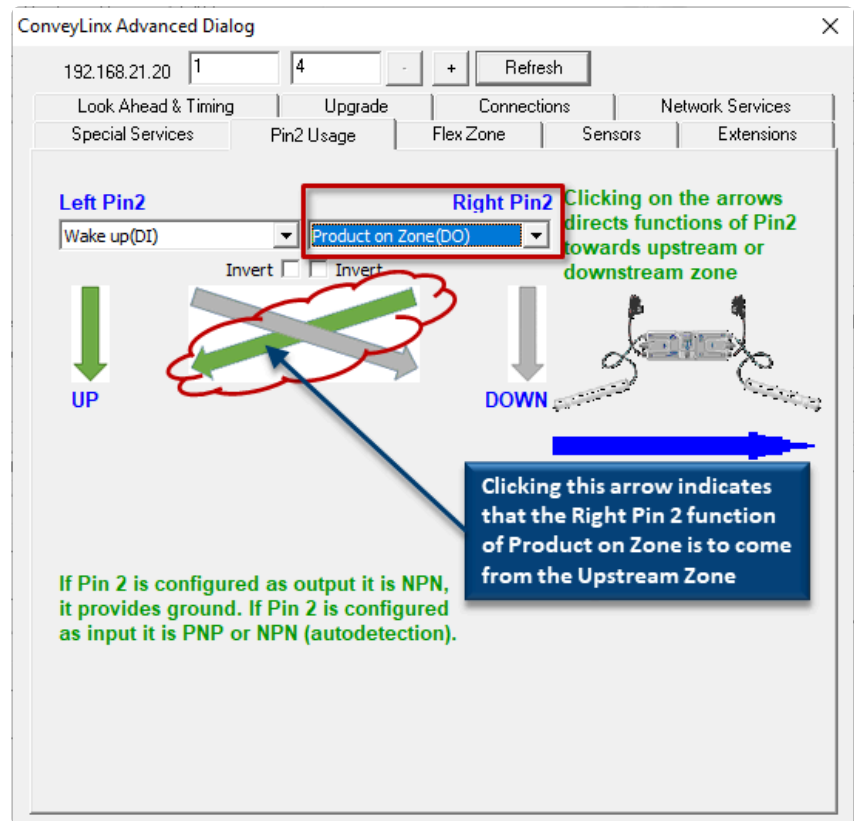
7.2.9.5. Most Upstream Zone Handshake Interlock

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. When the Left Pin 2 signal is energized, the upstream zone will run to accept an item



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

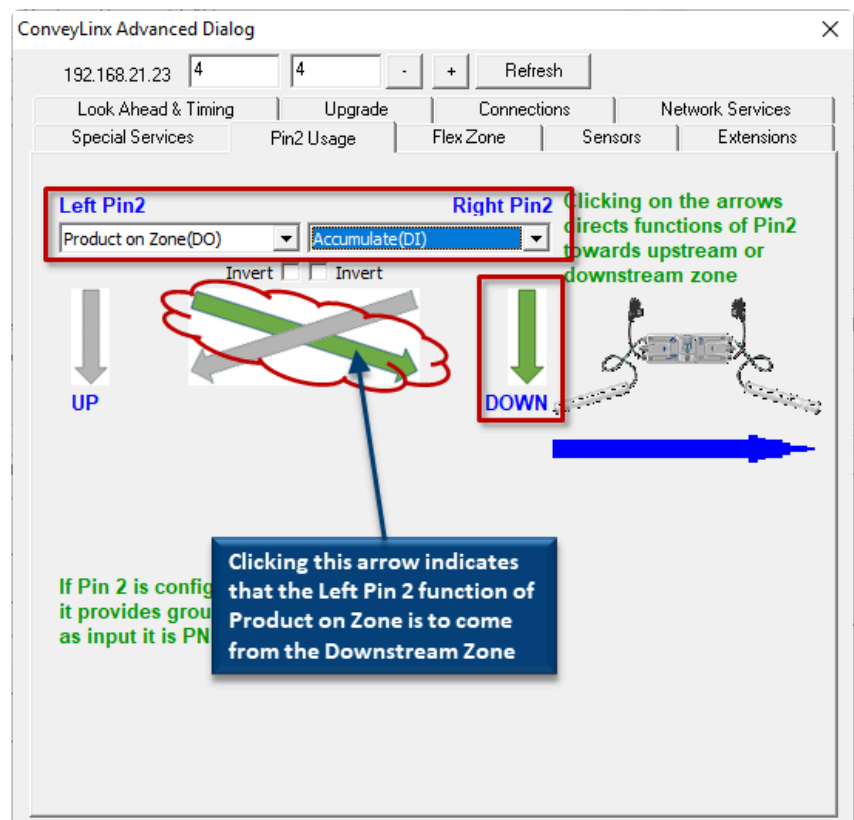


Last modified: Aug 18, 2020

7.2.9.6. 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 "DOWN" 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

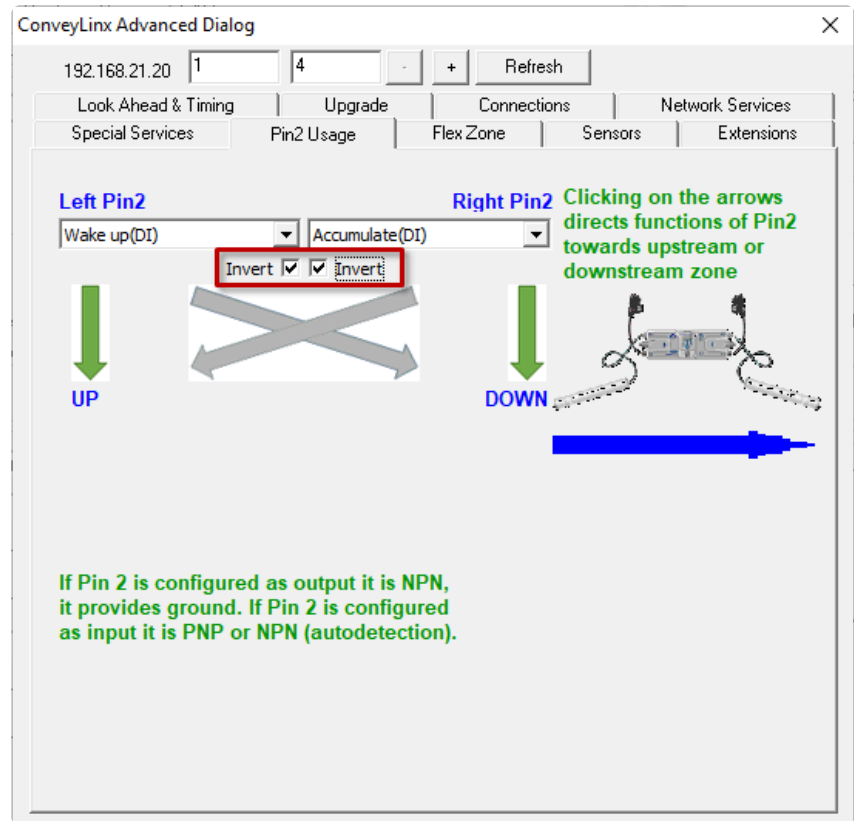


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7.2.9.7. Inverting the Pin 2 Signals

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



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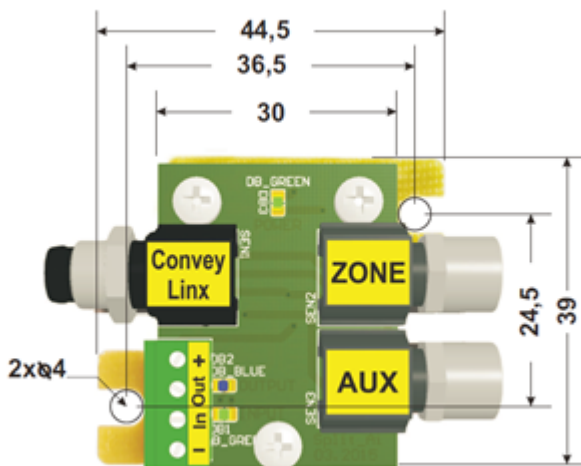
8. IOX Interface Module

In the section [Electrical Connections for Sensor Port Aux I/O](#), it is shown how to use off the shelf commercially available M8 cable accessories to gain access to the Aux I/O pin on the sensor ports.

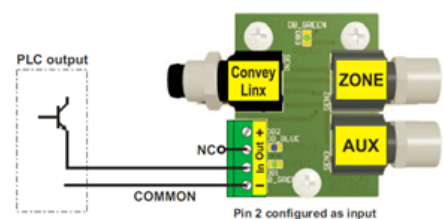
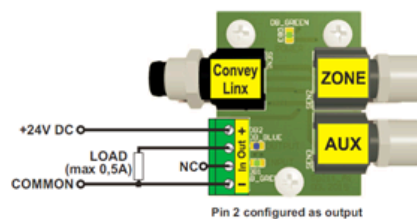
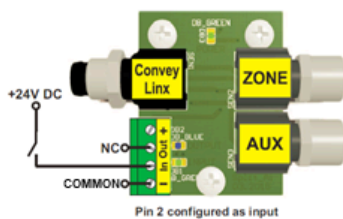
Pulseroller offers a Breakout/Splitter Module Accessory that offers the same cable splitter functionality as the commercially available M8 units along with breaking out some of the signals to convenient wire terminal access for flying lead devices.

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.

Mounting Dimensions

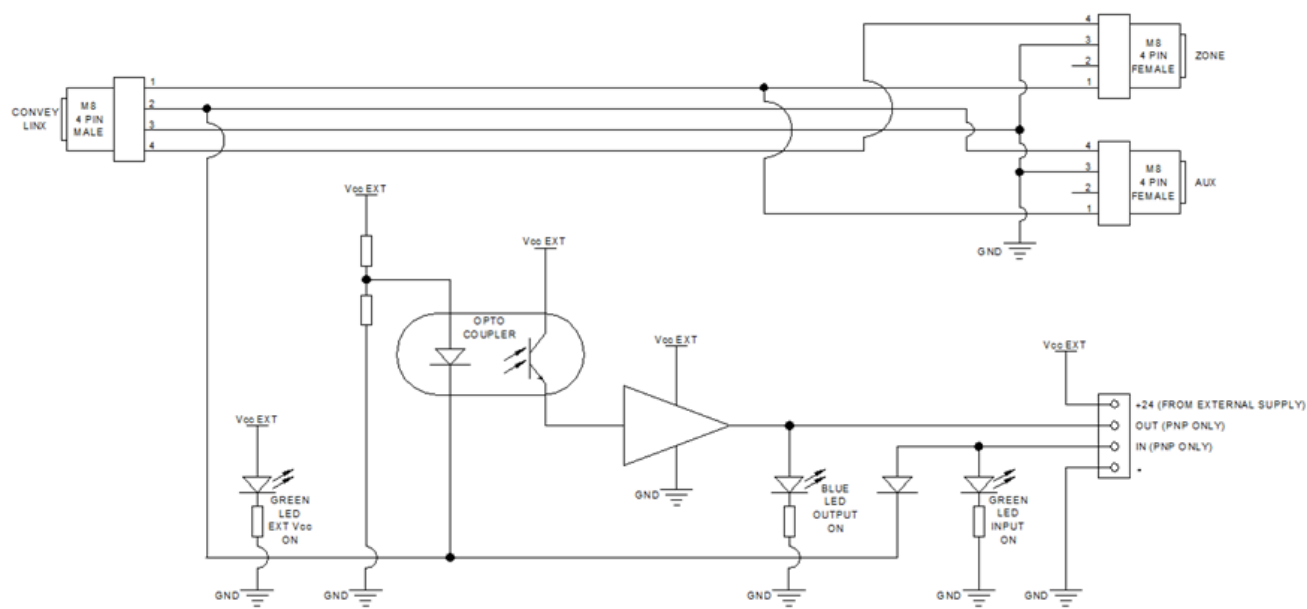


Wiring Diagrams



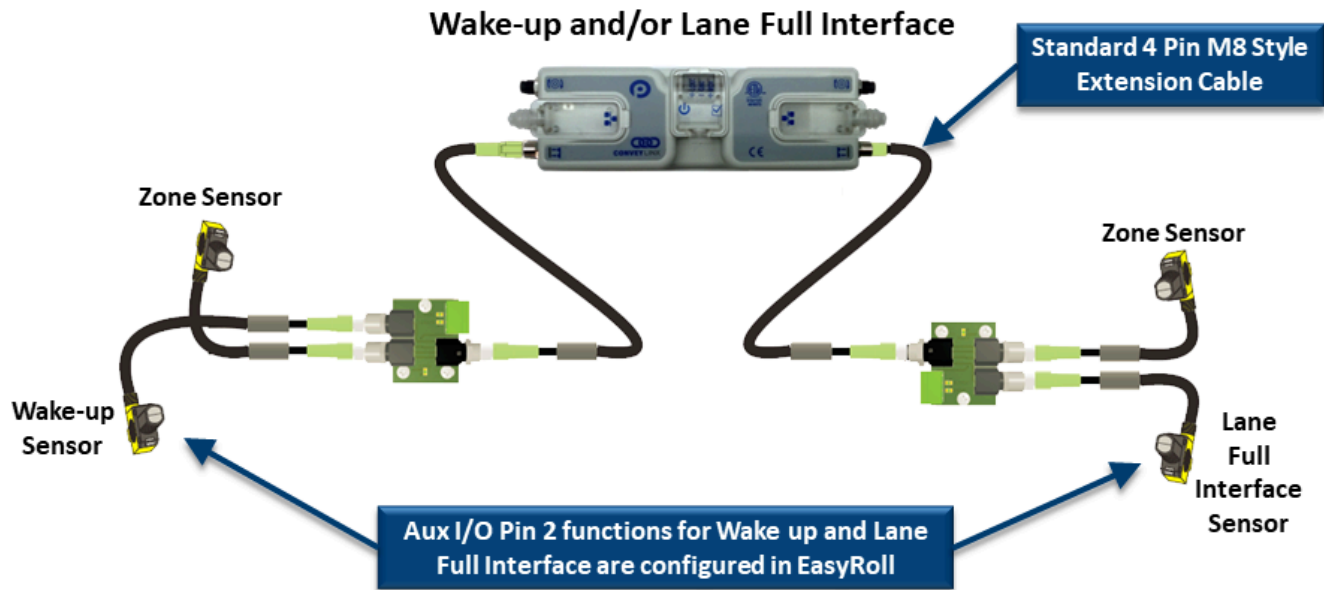
Electrical Schematic

Electrical Schematic of IOX-2 Module



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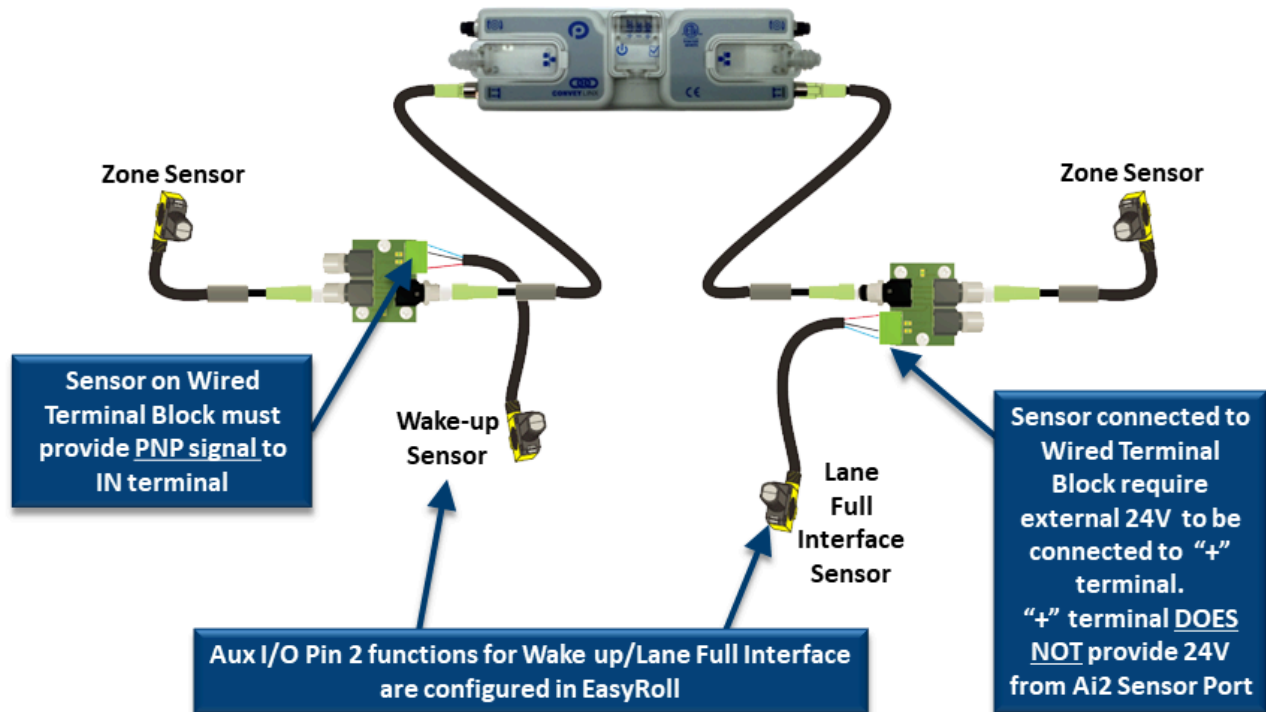
8.1. Wake up and/or Lane Full Interface



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8.2. Wake up/Lane Full with Wired Terminals

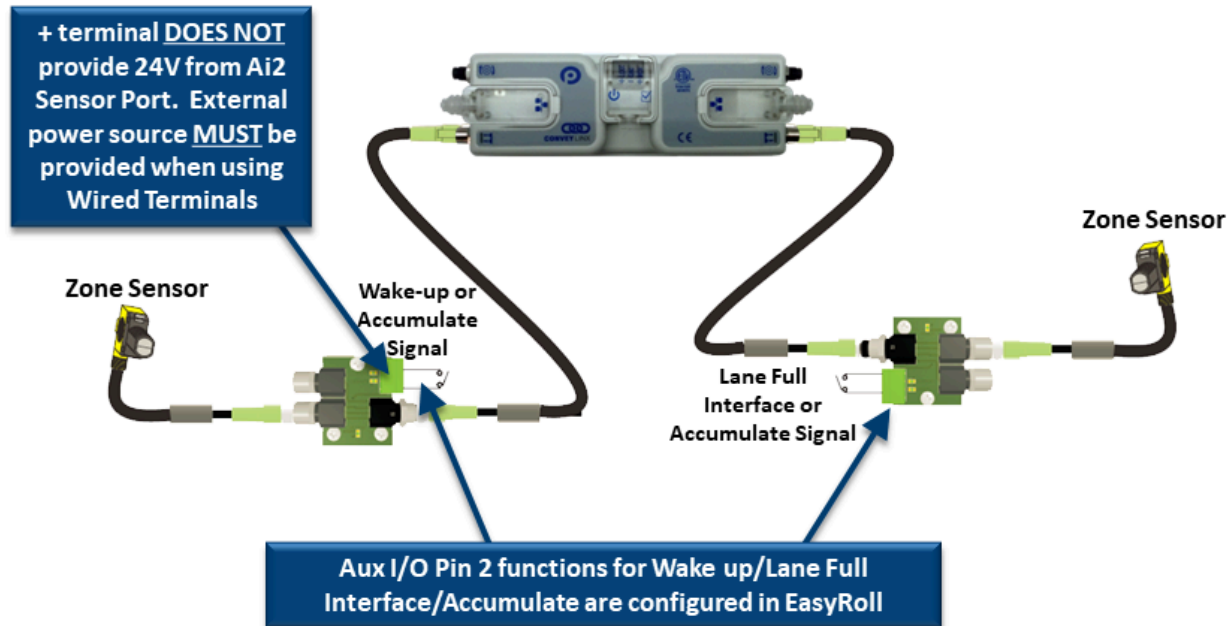
Wake-up and/or Lane Full Interface using Wired Terminals



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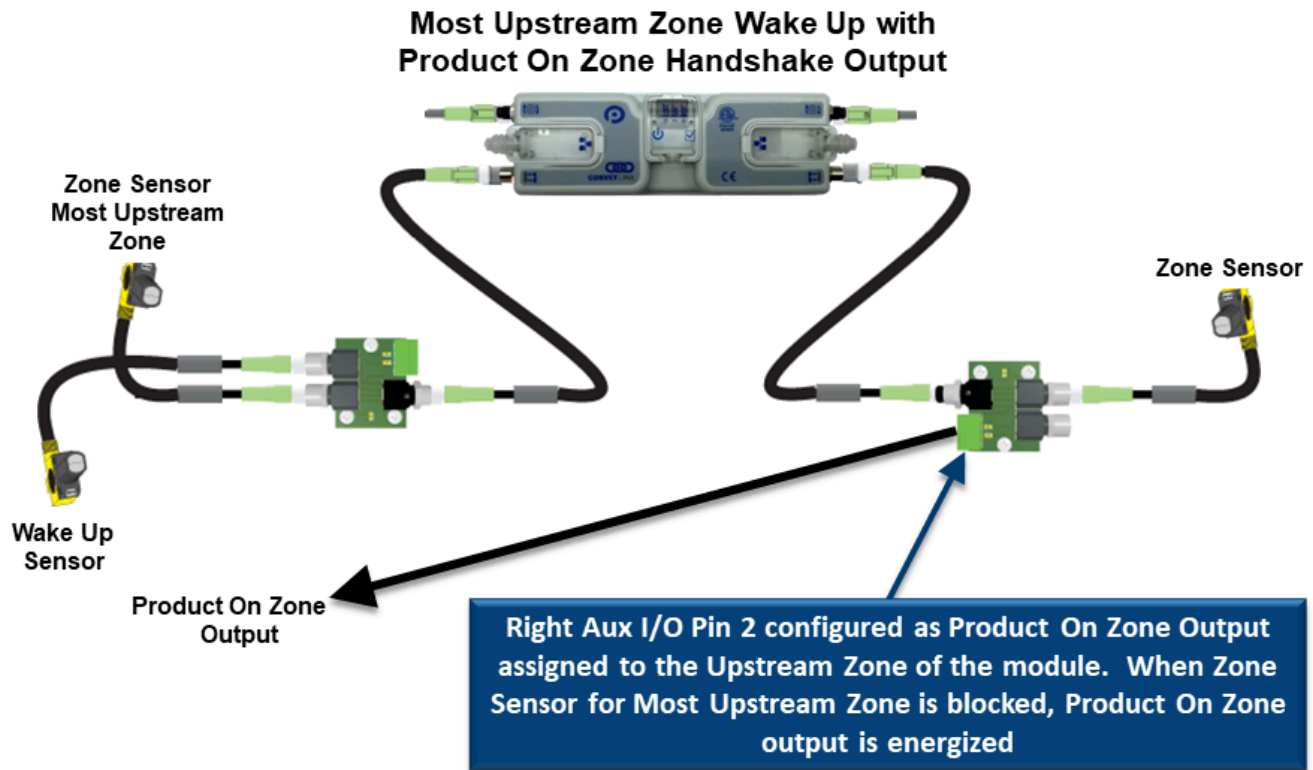
8.3. Wake up/Lane Full with Discrete Signals

Wake-up/Lane Full Interface/Accumulate using Discrete Signals to Wired Terminals



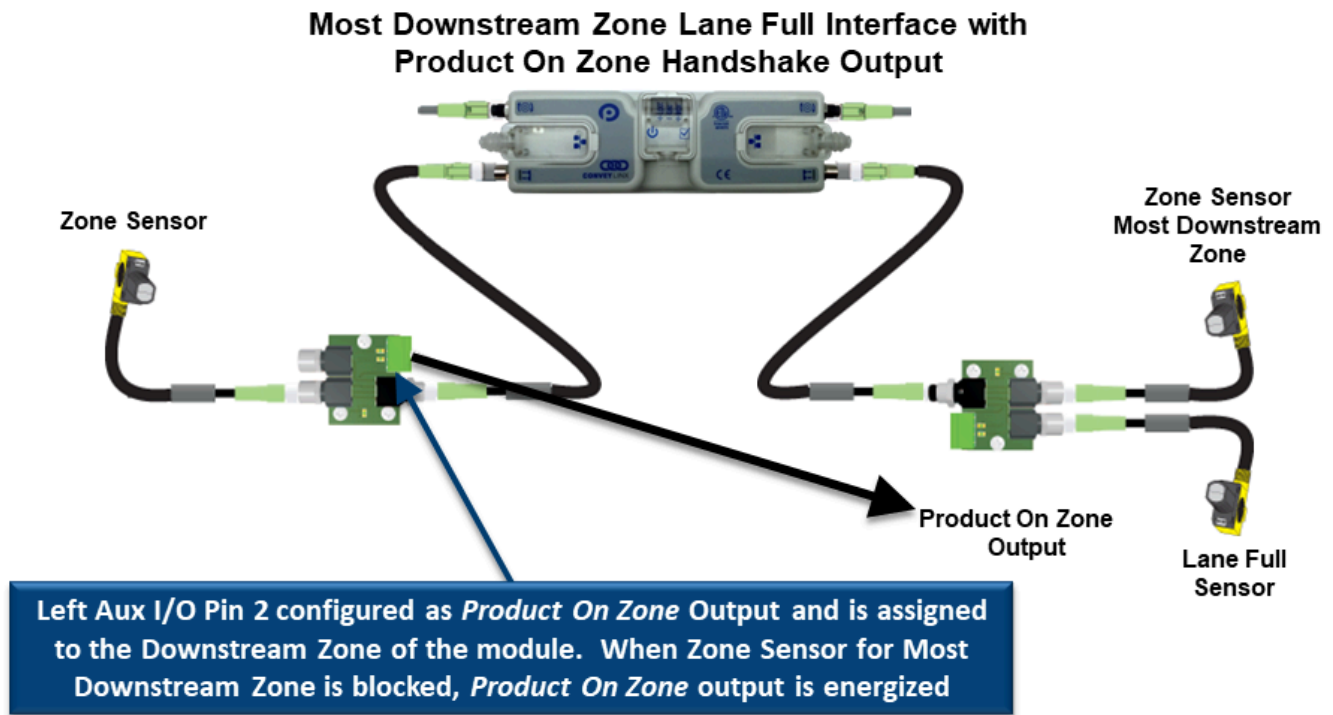
Last modified: Aug 04, 2020

8.4. Wake up/Product on Zone Handshake Interlock



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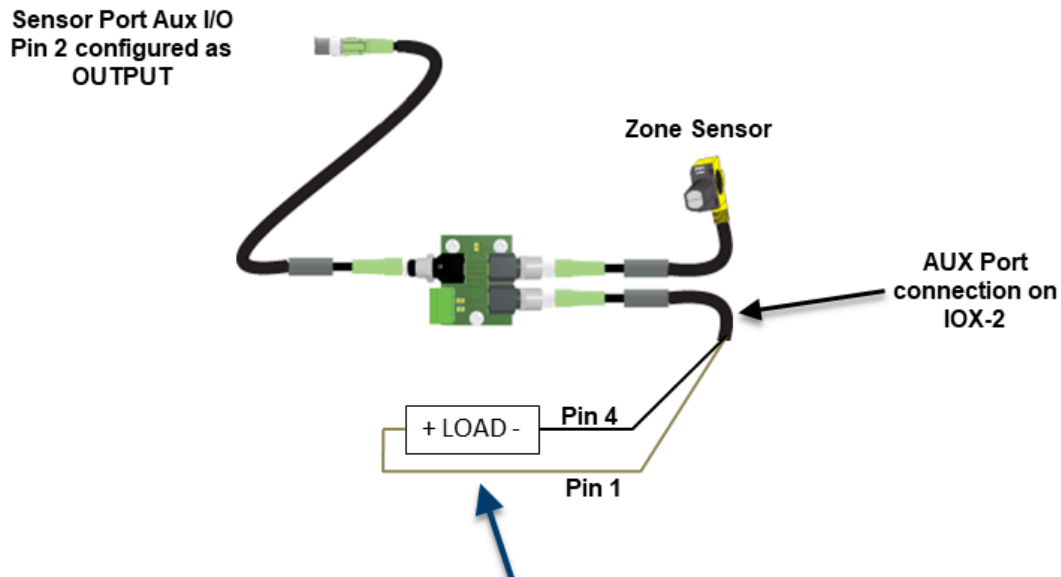
8.5. Downstream/Product on Zone Handshake Interlock



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8.6. Pin 2 Output on Aux I/O M8

Using AUX M8 Port to Connect Sensor Port AUX I/O Pin when
Aux I/O is configured as an OUTPUT

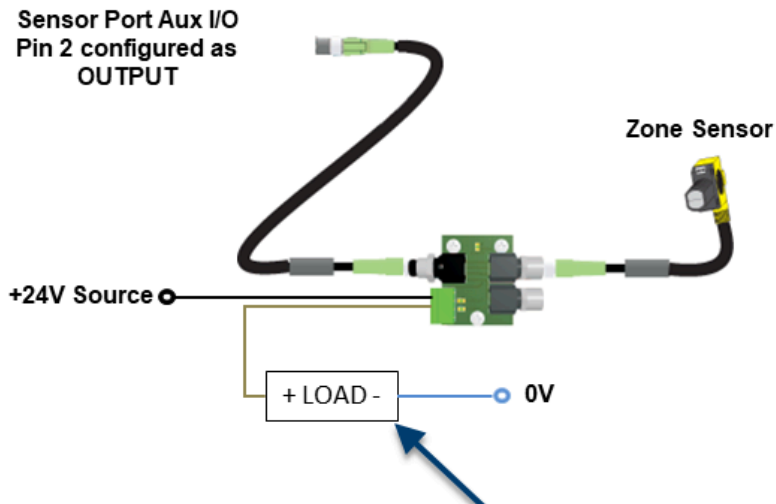


When the AUX M8 Port on the IOX-2 is used to connect the Sensor Port's AUX I/O Pin 2 signal as an output, the output signal is NPN and appears on PIN 4 of the AUX M8 Port

Last modified: Aug 04, 2020

8.7. Pin 2 Output on Wired Terminals

**Using Wired Terminals to Connect Sensor Port AUX I/O Pin
when Aux I/O is configured as an OUTPUT**



When the Wired Terminals on the IOX-2 are used to connect the Sensor Port's AUX I/O Pin 2 signal as an output, 24V source must be connected to the "+" terminal and a PNP signal is provided on the "OUT" terminal.

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