# User's Guide

Version 4.4

May 2014





Publication ERSC-1000

## GLOSSARY OF TERMS

| | |
|---|---|
| **ConveyLinx** | Conveyor controls architecture based upon modular distributed devices connected via Ethernet network. |
| **DHCP** | **D**ynamic **H**ost **C**onfiguration **P**rotocol 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** | **E**thernet **R**oller **S**peed **C**ontrol module - Conveyor control module that is part of the ConveyLinx family. Each **ERSC** can accommodate up to 2 **MDR**conveyor **zones** |
| **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 |
| **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** | **L**ight **E**mitting **D**iode – In the context of this document, **LED's** are used on the **ERSC** 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. |
| **Load** | A separate (usually wrapped or boxed) object to be transported by the conveyor. The terms **tray, tote,** or **carton** may also be used interchangeably in this document. |
| **MDR** | **M**otorized **D**rive **R**oller or **M**otor **D**riven **R**oller - 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 **load** on the zone |
| **PLC** | **P**rogrammable **L**ogic **C**ontroller – A wide variety of industrial computing devices that control automatic equipment |
| **PWM** | **P**ulse **W**idth **M**odulation – a control scheme that utilizes high speed switching transistors to efficiently deliver power in a controlled fashion from **ERSC**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.<br><br>**Reflex** (or sometimes known as **proximity**) type **photo-sensors** emit light to be reflected back from an object located sufficiently close to the sensor.<br><br>For both types of **photo-sensors**, when they detect their reflected light source, their signaling output circuit changes state. |
| **RJ-11 / RJ-12** | **R**egistered **J**ack 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** | **R**egistered **J**ack Style **45** – Standard connector / receptacle format utilizing 8 pin connections. The typical standard for computer network cable connections |
| **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. |
| **Singulation Release** | Conveyor control method for zoned controlled conveyor that dictates that when a **zone** is discharging its **load**, the upstream **load** waiting to enter must wait until the discharged **load** 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** | **T**ransport **C**ontrol **P**rotocol / **I**nternet **P**rotocol - **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 load** can move in unison with the discharging **load**. |
| **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** | **Z**ero **P**ressure **A**ccumulation – 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 |

## SYMBOL CONVENTIONS

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

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

## IMPORTANT USER INFORMATION

*ConveyLinx ERSC* 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, Insight Automation Inc. does not assume responsibility or liability (to include intellectual property liability) for actual use based on the examples shown in this publication

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## SUMMARY OF CHANGES

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

| Revision | Date | Change / Update |
|---|---|---|
| 3.0 | August 31 2009 | Major revision to Easy Roll software section, added descriptions for new functionality |
| 3.1 | July 2010 | Updates to Hardware Interface and to *EasyRoll* software functionality, general updates |
| 4.0 | September 2012 | General revision, updated SE3 section, added new appendix for real world applications, updated many graphics in the document. |
| 4.1 | November 2013 | Update to Sensor & Control Port to include fusing information and current limitation, updated SE section to include ERSC-SE4 module and external power connection capability. |
| 4.2 | January 2014 | Added Global Contact Information |
| 4.3 | April 2014 | Updated Global Contact Information |
| 4.4 | May 2014 | Minor format revision |

## GLOBAL CONTACT INFORMATION

## SUMMARY OF HARDWARE CHANGES

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

| Hardware Revisions | | |
|---|---|---|
| **Revision** | **Date** | **Change / Update** |
| 1.0 | February 2009 Serial # 87716 | Initial Release |
| 2.0 | July 2010 Serial # 102311 | • Advanced Ethernet switch additions includes, improved switching engine, enhanced diagnostics, and better support for straight/crossover cables.<br>• The RJ45 Ethernet connections werephysically rotated 180degrees for ease of installation.<br>• Activity LED was removed from the front of the card. |
| 3.0 | April 2013 Serial # 137101 | • Thicker traces and enhanced solder points in a few critical areas of the printed circuit board (PCB).<br>• The PCB traces allowed for an increase in the hardware protection limit.  Previous revisions were 19A peak, but the latest revision 3.0 has a peak of 21.5A.<br>• Power-supply changed to be much more efficient which now uses less energy and creates less overall heat.<br>• Changed pull-up resistors for Hall Effect inputs on the motor connector.  This greatly improved operations with extension cables.<br>• Power supply for the Hall Effect sensors was increased from 6.5V to 9V to support a wider range of motor rollers. |

# TABLE OF CONTENTS

## PREFACE

### WHO SHOULD USE THIS MANUAL?

This manual is intended for users who need basic product information and simple application procedures to implement *ConveyLinx ERSC* 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.

For users and integrators interested in PLC based control integration with *ConveyLinxERSC* modules should refer to Insight Automation publication *ConveyLinx Developer's Guide* (publication *ERSC-1500*)

*Insight Automation offers training classes on how to best apply ConveyLinx MDR controls in your applications.  Get a head start on engineering, commissioning, programming and various installation methods for ConveyLinx. Contact our office more details and scheduling.*

### PURPOSE OF THIS MANUAL

The purpose of this manual is to:

- Identify the components and ports available on a module

- Provide guidelines for proper installation and wiring

- Provide examples on basic inter-module connections for linear conveyor

- Introduce the *EasyRoll* software tool and provide instructions to configure and modify parameters.

### NOT INCLUDED IN THIS MANUAL

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

# INTRODUCTION TO CONVEYLINX®

## CONVEYLINX® CONCEPT

*ConveyLinx* control system as applied to conveyor control is a series of individual *ConveyLinx ERSC* modules interconnected via standard shielded Ethernet cabling to form an integrated solution for MDR (Motorized Drive Roller) conveyor functionality.  Each *ConveyLinx ERSC* module can accommodate up to 2 MDR's and 2 photo-sensors to provide control for up to 2 conveyor zones.  Each *ERSC* also includes convenient connectivity ports for upstream and downstream Ethernet network cabling as well as connectivity ports for discrete I/O signals with non-networked controls for local interlock interface functions.
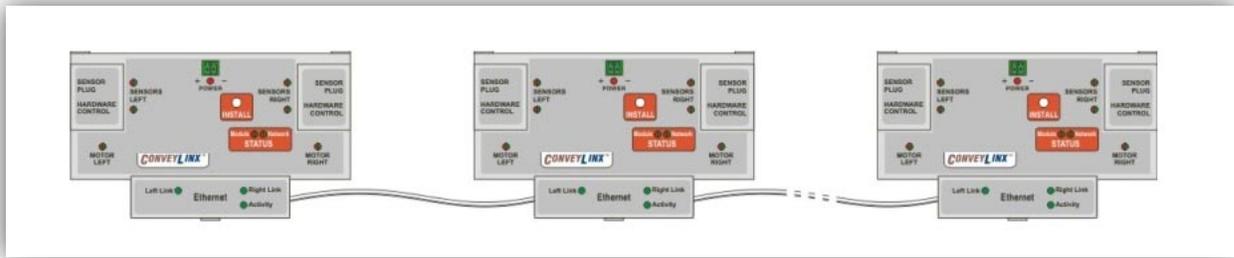


**FIGURE 1 - CONVEYLINX® CONCEPT WITH ERSC MODULES**

*ConveyLinx ERSC* modules can be easily automatically configured to operate multiple zones of linear conveyor "right out of the box" with the push of a button without any special tools or PC software required. However, with the *ConveyLinx Easy Roll* software tool and a PC; each *ERSC* module's default configuration can be modified to customize functionality for specific applications.

## ConveyLinx® System Components

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

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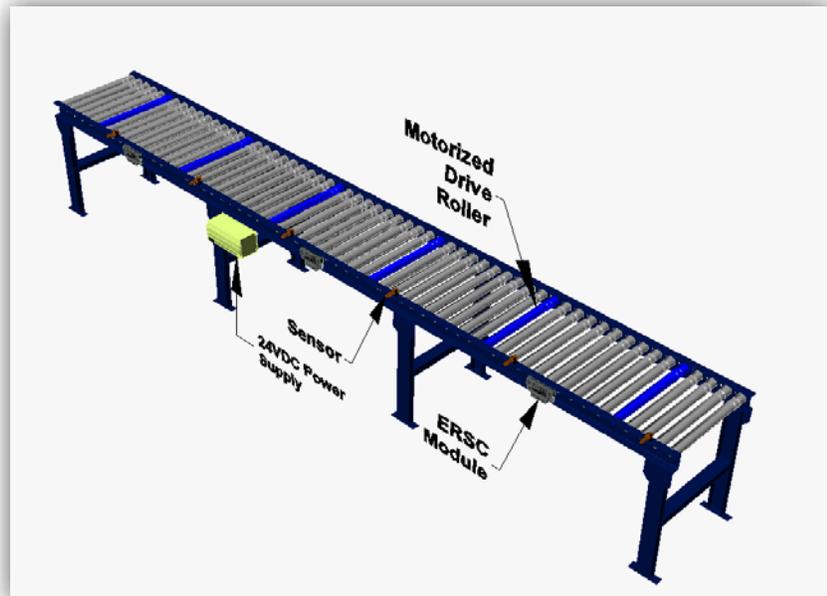


## ConveyLinx® ERSC Module Features

Each individual *ConveyLinx ERSC* module has the following features:

- ✓ Built-in Ethernet switch
- ✓ Modular RJ style connection ports for photo-sensors and interfacing signals
- ✓ Modular JST style connectors for MDR
- ✓ Single 24VDC power connection for motor and control
- ✓ Context-sensitive multi-color LED indicators
- ✓ Thermal and over-current protection for MDR
- ✓ Automatic light/dark operate detection for photo-sensor inputs
- ✓ Automatic PNP/NPN detection for photo-sensor and hardware inputs
- ✓ Control Port Output default is PNP. To use NPN interlocking a SE Module is required.
- ✓ Proportional / Integral (PI) MDR speed regulation option
- ✓ Four MDR braking method options
- ✓ Adjustable acceleration and deceleration time and distance capability
- ✓ MDR mechanical brake control option
- ✓ Multiple MDR manufacturer capability

## ConveyLinx® Control System Features

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

- ✓ Single zone to zone zero pressure accumulation (ZPA) control as default mode.

- ✓ Optional configuration for *Train Release* and *Gap Train Release* modes.

- ✓ Automatic *Flexible Zone Recognition* logic to detect and handle load sizes exceeding the length of one physical zone.

- ✓ Optional configuration for *Look Ahead Slow Down* mode for higher speed applications.

- ✓ Ability to bridge separate Ethernet sub-networks for seamless operation.

- ✓ Ability to designate an *ERSC* to be an "Extension" to another *ERSC* such that it operates as simple motor controller.

The first sections of this manual will describe in detail the hardware and connectivity requirements for *ERSC* modules and the "one button" configuration procedures for simple linear conveyor installation.

The latter sections of this manual will describe a brief overview of the *EasyRoll* software package to gain access to the various optional configuration parameters and utilities.  For more details, the *EasyRoll* Software package now has "Pop-Up" dialogue boxes for each function within *EasyRoll*.

## ERSC Module Hardware Overview

*ConveyLinx ERSC* modules are designed to be installed and integrated into the conveyor's mechanical side frame assembly. Please refer to *Appendix A – Dimensions and Mounting* Informationon page 113for module dimensions and mounting details.

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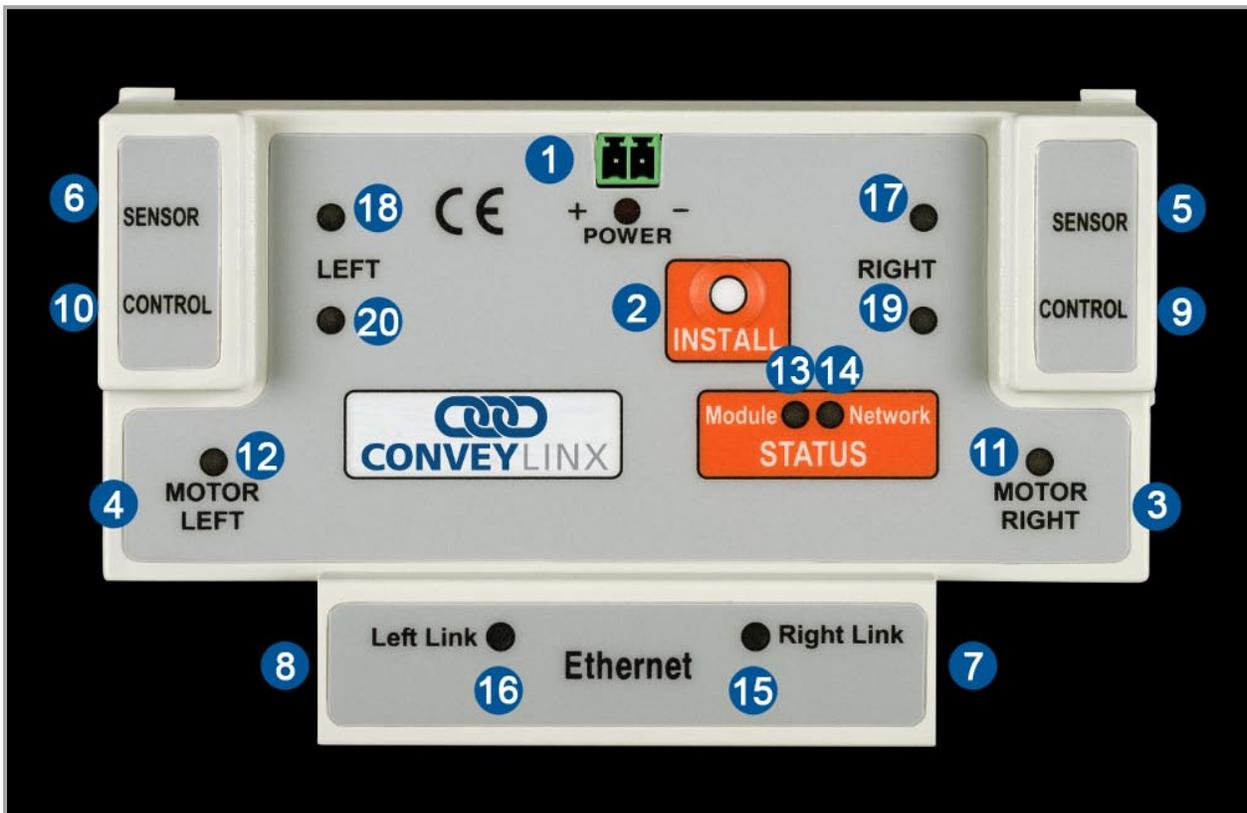


FIGURE 2 - ERSC MODULE HARDWARE FEATURES IDENTIFICATION

| Item | Description |
|------|-------------|
| 1 | 24VDC Power Connector |
| 2 | Install Button – Used for Auto Configuration and module reset functions |
| 3 & 4 | *Motor Left* and *Motor Right* - 9-pin JST style header for MDR connection |
| 5 & 6 | *Left Sensor Port* and *Right Sensor Port* – RJ-12 style jack for zone photo-sensor connection |
| 7 & 8 | *Link Left* and *Link Right* –RJ-45 style Ethernet network communication connection between modules |
| 9 & 10 | *Left Control Port* and *Right Control Port* – RJ-12 style ports for discreet hard-wired signal connections for non-networked interface interlocks and zone control |
| 11 & 12 | Motor Left LED & Motor Right LED – Motor status indicators |

| Item | Description |
|------|-------------|
| 13 | Module Status LED Indicator |
| 14 | Module Network Status LED Indicator |
| 15 & 16 | Left Link & Right Link Status LED Indicators |
| 17 & 18 | Left Sensor & Right Sensor Status LED Indicators |
| 19 & 20 | Hardware Left & Hardware Right Status LED Indicators |

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

## HARDWARE CONNECTIONS

### MOTOR LEFT AND MOTOR RIGHT PORTS

Both of these ports utilize a 9-pin JST brand female receptacle.  Each receptacle is mechanically keyed to assure proper orientation upon plugging in.
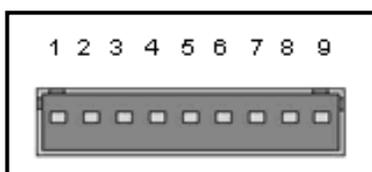


**FIGURE 3–JST DIAGRAM**



**FIGURE 4 - MOTOR PLUG-IN EXAMPLE**

| Pin | Description |
|---|---|
| 1 | GND – Motor & Sensor Ground |
| 2 | Vcc – Hall Effect Sensor Power |
| 3 | Motor Winding U |
| 4 | Motor Winding V |
| 5 | Motor Winding W |
| 6 | Hall Effect Sensor U |
| 7 | Hall Effect Sensor V |
| 8 | Hall Effect Sensor W |
| 9 | Optional Mechanical Brake Control |

## SENSOR LEFT AND SENSOR RIGHT PORTS

Each sensor port is a standard RJ-11 style jack with the following pin-out:
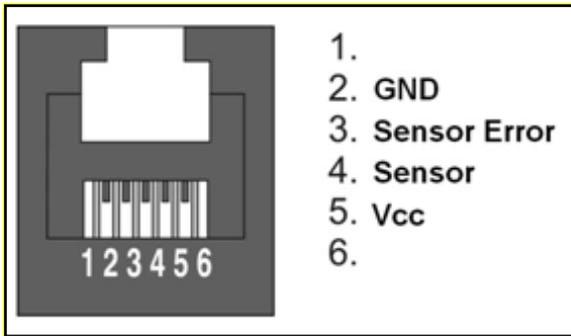

**FIGURE 5–CONVEYLINX SENSOR PORT DIAGRAM**


**FIGURE 6 - ERSC WITH SENSOR PLUGGED IN**

The signals are defined by the following chart:

| Pin | Signal | Description |
|---|---|---|
| 1 | | Not Used |
| 2 | GND | Module DC Common |
| 3 | Sensor Error | Logical Input for Sensor's error output – Auto detect for NPN or PNP |
| 4 | Sensor | Logical Input for Sensor's state output – Auto detect for NPN or PNP |
| 5 | Vcc | Module 24VDC Supply |
| 6 | | Not Used |

⚠️ **Shorting Pins 2 & 5 (Vcc and Gnd) will damage the port's Sensor Detect circuit. If this circuit is damaged, the module will no longer properly detect a connected sensor and will not properly Auto-Configure.**

## LEFT AND RIGHT CONTROL PORTS

Each of these ports is identical in logical input and output pin-out as each Sensor port.  The signals are defined as in the following chart:

| Pin | Signal | Description |
|-----|--------|-------------|
| 1 | Output E | Interlock with Upstream/Downstream Module, SE Module recommended |
| 2 | GND | Module DC Common |
| 3 | PNP/NPN | Optional Zone Accumulate Control |
| 4 | PNP/NPN | Interlock with Upstream/Downstream Module |
| 5 | Vcc | Module 24VDC Supply |
| 6 | Output C | Interlock with Upstream/Downstream Module, SE Module recommended |

### SENSOR AND CONTROL PORT FUSING

Because the ERSC utilizes a single external power connection for both control power and MDR power; the module includes internal resettable fusing to protect the control power from the MDR power.  The overall control power fuse is rated at 300 mA and this is the source for CPU, LED's, sensor ports, control ports, etc.  From this circuit, the Sensor and Control port pairs share their own separate 150 mA fuses.  Figure 7 shows the basic schematic for the ERSC control power.
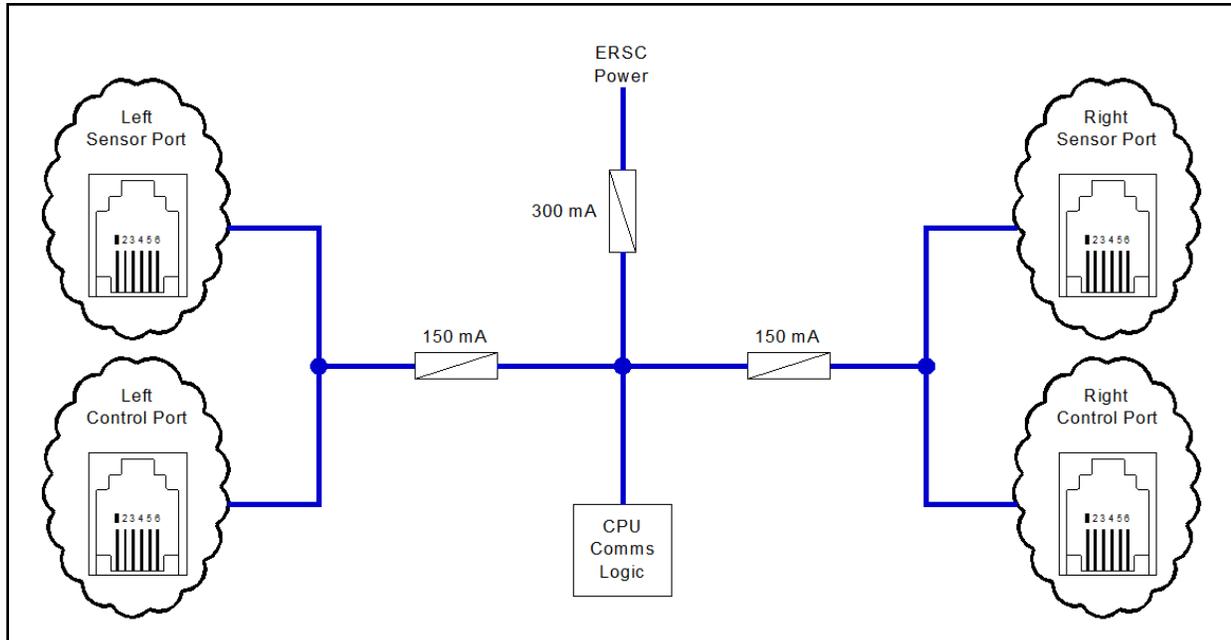


**FIGURE 7 - ERSC CONTROL POWER FUSING**

If the 300 mA fuse trips, then the module will reset and perform a reboot.  However, if either of the 150 mA fuses trips, there is no direct indication of this state, because the LED's associated with the Sensor and Control Ports are part of the 300 mA fuse's circuit.

User's must take care in the types of sensors and devices that need to connect to a given ERSC and assure that the current draw on any Sensor/Control port pair does not exceed the fuse ratings.

If any of the 150 mA fuses shown trips, there is no direct indication of this state.  An indirect indication could be to see if a connected sensor is powered when plugged into either port.

If there are power concerns for devices connected to Sensor or Control Ports, see section *Using ERSC-SE4 Terminal Breakout* Module on page 66 on how to use an external ERSC-SE4 module to connect an external power source for Sensor / Control ports.

## ETHERNET LEFT AND ETHERNET RIGHT PORTS

Both of these ports are standard RJ-45 jacks conforming to standard Ethernet connection pin-out.



**FIGURE 8 - ERSC WITH LEFT & RIGHT ETHERNET CABLES**
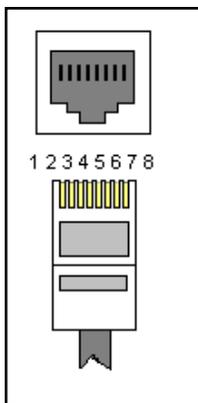


**FIGURE 9 - STANDARD RJ-45 PIN-OUT**
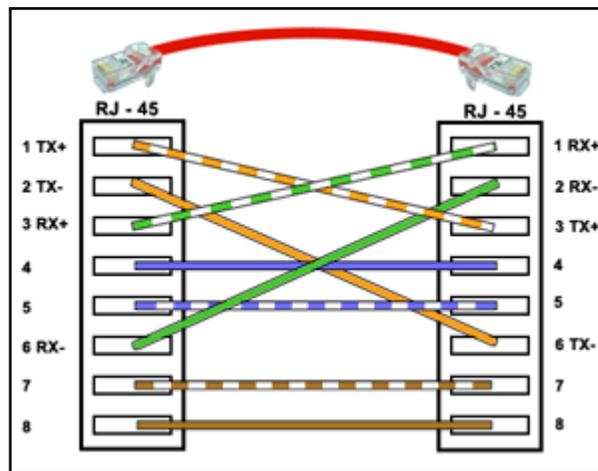


**FIGURE 10 - ETHERNET CROSSOVER CABLE DIAGRAM FOR REVISION 1**

**All Hardware Revision 1 ConveyLinx Modules must use Ethernet shielded crossover style cables. Hardware Revision 2 and later modules can use straight or crossover shielded Ethernet cables. Failure to use SHIELDED cables may result in data loss and unexpected results.**

## CONNECTIONS FOR LINEAR CONVEYOR

For linear conveyor operation, *ERSC* modules are designed to perform an Auto-Configuration Procedure (as described in detail in section

*Auto-Configuration* Procedure on page 34).

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

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

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

A single *ERSC* module can operate as a:

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


The following examples illustrate these connections.

## EXAMPLE 1 – TWO ZONE CONTROLLER
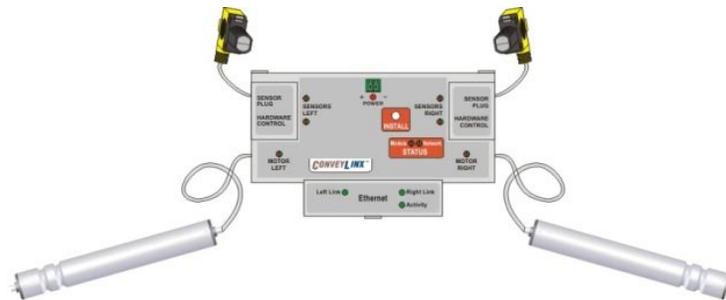


In this example an MDR and photo-sensor is connected to both the Left and Right group of ports. The module will control the 2 MDRs as independent logical conveyor zones.

### EXAMPLE 2 – SINGLE ZONE CONTROLLER
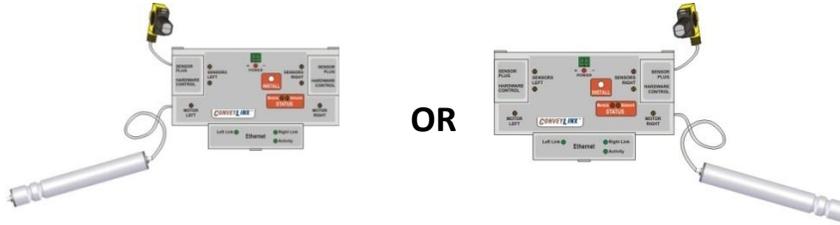


In this example, a single MDR and photo-sensor is connected to either the Left or Right group of ports. The module controls the MDR as a single independent logical conveyor zone.

### EXAMPLE 3 – DUAL MDR SINGLE ZONE CONTROLLER
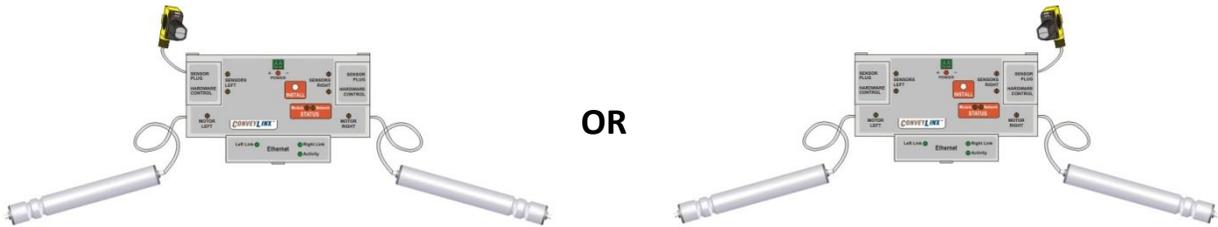


In this case the *ERSC* module will control 2 MDR's in tandem and operate as a single zone with a single photo-sensor connected to either the Left or Right port. This configuration is typical for belted zones used particularly on inclined conveyors which require the added torque of a second MDR to accommodate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

### INVALID CONFIGURATION EXAMPLES

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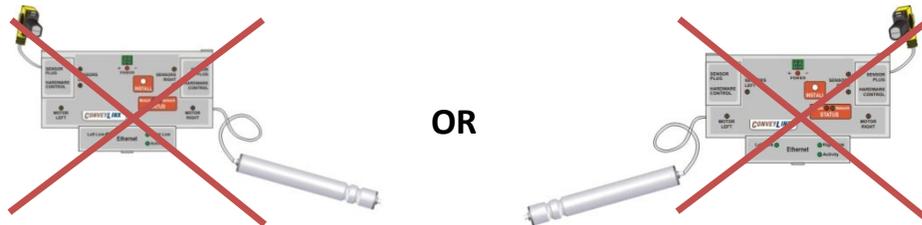


In these cases the module will try to act as a Single zone conveyor control, but the MDR's are not plugged into same Left/Right port group as the photo-sensors.

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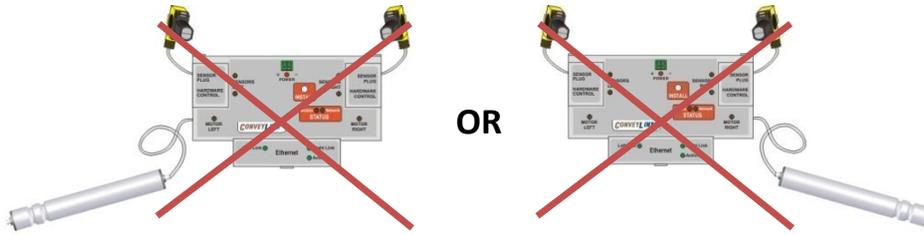
In these cases the *ERSC* will try to act as a two-zone conveyor control but only one MDR is connected.

**These invalid configurations will not cause the Auto-Configuration function to fail.  The user will only experience incorrect operation and/or unexpected results.**

## MOTOR DIRECTION DEFINITION

The *ERSC* 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 as depicted below in Figure 11.
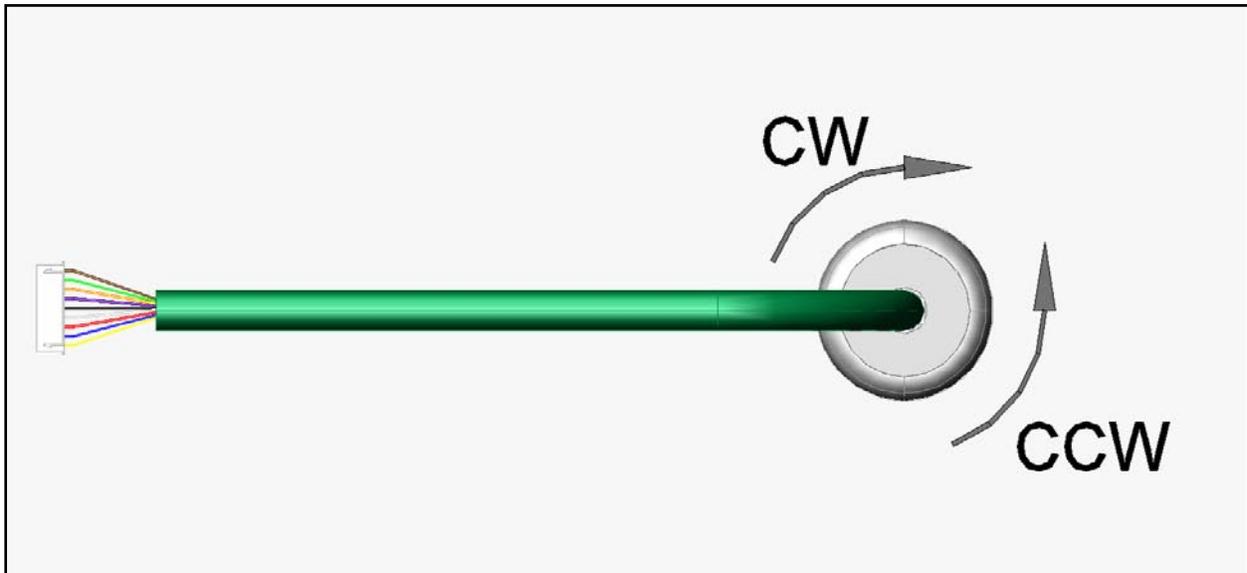


**FIGURE 11 - MOTOR ROTATION DIRECTION CONVENTION**

**This rotation definition convention applies to all Pulse Roller brand MDRs.  Selection of CW and CCW for certain models of other manufacturer's MDRs may not result in actual clock-wise or counter clock-wise rotation.  Installations utilizing other manufacturers MDR's may require configuration using the** *EasyRoll* **software tool to both select the equivalent MDR and to set the desired operational direction.**

**By default Pulse Roller brand MDRs will operate in the CW direction. Use the** *EasyRoll* **software tool to change rotation if needed.**

**By default** *EasyRoll* **sets the MDR type to Pulse "28 Watt Roller". Use the** *EasyRoll* **software tool to select the correct MDR type installed.**

## NETWORK AND POWER CONNECTIONS

Once MDR's and photo-sensors have been connected based upon the desired conveyor arrangement (1 zone, 2 zone, dual motor zone, etc.); all the *ERSC* modules that make up the linear conveyor arrangement need to be interconnected with shielded Ethernet cables*(Hardware Rev.1 modules must use shielded crossover Ethernet cables)*and each module needs to receive a24VDC power connection.  The Power Plug connection is the power source for all logic, photo-sensors, and MDR's.


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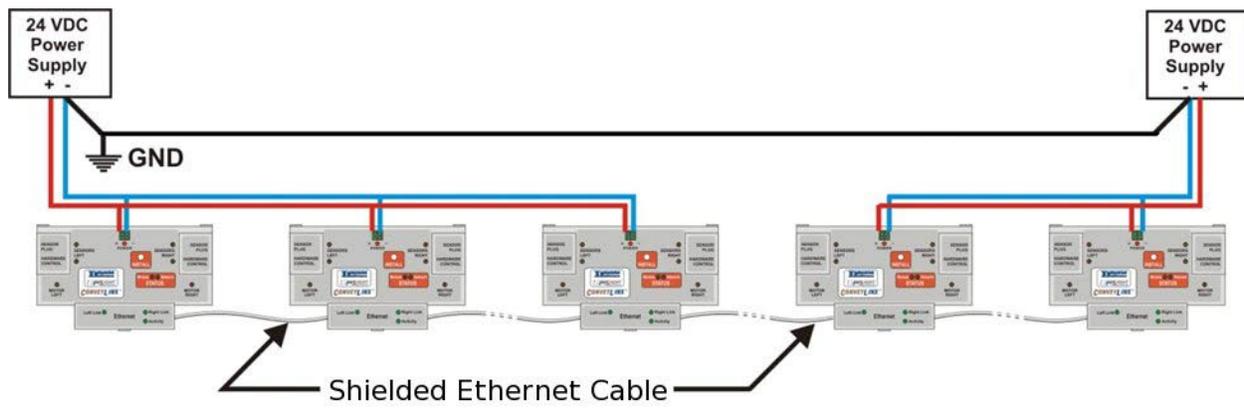
⚠ This document assumes the user is aware of MDR power requirements for the application and that the user and/or installer have properly sized 24VDC power supplies and wiring based upon all applicable codes and standards.  This document also assumes installation will follow proper equipment grounding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

⚠ The Ethernet interconnections between *ERSC* modules on a linear conveyor must be continuous with no other Ethernet devices (Ethernet switch for example) physically connected between any module in the network chain.  The Auto-Configuration Procedure described below will fail if it encounters any non-*ConveyLinx* module device on its subnet.

# STATUS INDICATORS

*ERSC* module status is indicated by several LED's.  All LED's with the exception of the Ethernet Link and Activity LEDs are multi-coloured and context sensitive.  The following chart indicates the various meanings of all *ERSC* LED indicators.  Please refer to **Error! Reference source not found.** on page **Error! Bookmark not defined.** for the item number locations on the module.  By definition *Blinking* is approximately ½ second on/off cycle and *Flashing* is approximately ¼ second on/off cycle.

## COMMUNICATIONS

| Indicator | Item | LED State | Description |
|---|---|---|---|
| Ethernet Left Link | 16 | OFF | No connection established |
| | | Solid Green | Connection is established |
| | | Blinking Green | When data transmission activity is occurring |
| Ethernet Right Link | 15 | OFF | No connection established |
| | | Solid Green | Connection is established |
| | | Blinking Green | When data transmission activity is occurring |

## NETWORK & MODULE FUNCTION

| Indicator | Item | LED State | Description |
|---|---|---|---|
| Module Status | 13 | Solid Red | *ERSC* is booting up |
| | | *Blinking* Red | *ERSC* is starting task processes |
| | | *Blinking* Green | *ERSC* is ready |
| | | Flashing Green & Blinking Red | Failsafe Mode |
| | | Flashing Red | Auto Configure Mode is active |
| | | Blinking Amber | Performing firmware upgrade check |
| | | Solid Amber | Firmware upgrade in progress |
| Network Status | 14 | Solid Red | Starting Inter-module communications |
| | | Blinking Red | Establishing inter-module connections |
| | | Blinking Green | Inter-module communications established |

## MOTORS

| Indicator | Item | LED State | Description |
|---|---|---|---|
| Motor Left & Motor Right | 11 & 12 | OFF | Motor is not running and no faults detected |
| | | Solid Green | Connection is established |
| | | Solid Red | • If Motor is running, indicates current limit<br>• If Motor is stopped, indicates motor is not connected properly or is overheated |
| | | Blinking Red | Motor is overloaded and *ERSC* is limiting current to reduce temperature |
| | | Flashing Red | Motor short circuit detected between at least two of the phase windings |

## SENSORS

| Indicator | Item | LED State | Description |
|---|---|---|---|
| Sensor Left & Right | 17 & 18 | Solid Green | Sensor (Pin 4) Input energized |
| | | Solid Red | Sensor (Pin 3) Error Input energized |
| | | Blinking Red | Zone Jam or missing sensor |
| Hardware Control Left & Right | 19 & 20 | Solid Green | Pin 4 Input energized |
| | | Solid Red | Pin 3 Input energized |
| | | Flashing Red | *ERSC* configuration error |
| All Sensor & Hardware Indicators | 17 & 18<br>19 & 20 | Flashing Red | Network E-Stop Condition |

## Auto-Configuration of Linear Conveyor

The purpose of Auto-Configuration for networked *ConveyLinx* controls is to provide a simple and easy procedure for linear conveyor system commissioning that does not require a PC or PC based software to implement. The Auto-Configuration of Linear Conveyor feature of *ConveyLinx* requires only the proper interconnection of each module and the press of a button on the most upstream module to complete.

### 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 or totes on the conveyor is continuous from in-feed zone to discharge zone.
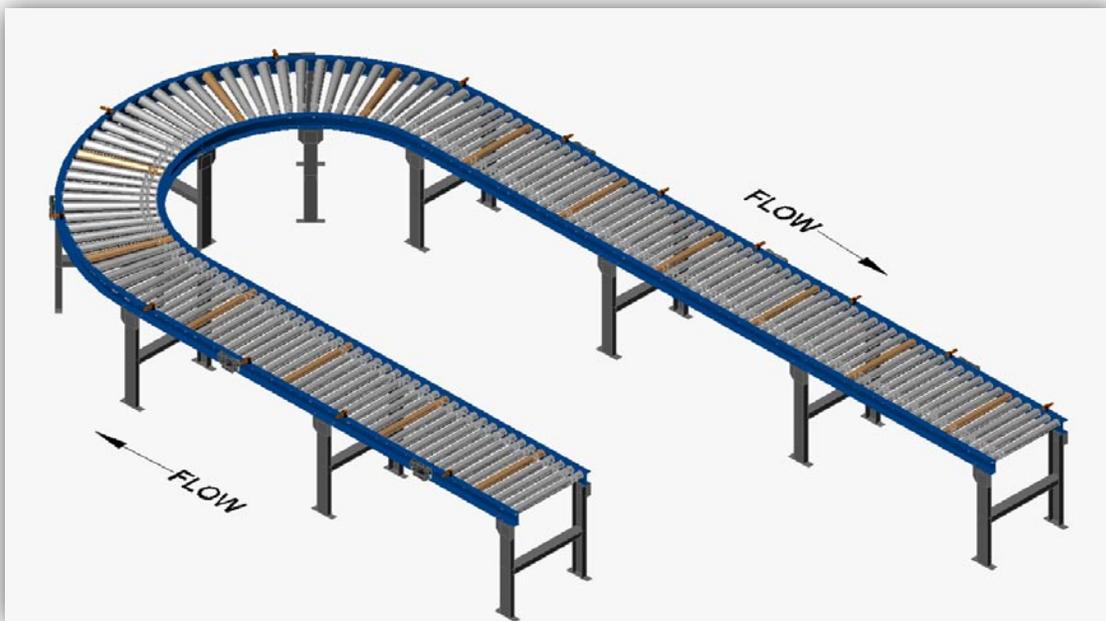


FIGURE 12 - SIMPLE LINEAR CONVEYOR EXAMPLE

A networked *ConveyLinx* solution is capable of controlling more complex conveyor paths that include diverting and merging equipment. However, this requires configuration with a PC and software. Please refer to the Pop-up self-help within the *EasyRoll* for details on PC based configuration.

## AUTO-CONFIGURATION PROCEDURE

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

1.  Press and hold *INSTALL* button on the most upstream/in-feed end *ConveyLinx* module and keep it held for 5 seconds.

2.  After 5 seconds the *Module Status* LED will flash RED.

3.  Once *Module Status* LED begins flashing RED, the *INSTALL* button must be released within 2 seconds.  If held for longer than 2 seconds; the procedure is cancelled.

4.  Once the *INSTALL* button has been released within the 2 second time window, the module will be initiated as the *Auto-Configuration Master* and the Auto-Configuration routine will begin.

⚠️ **In order 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 EXAMPLES

The *ConveyLinx* Auto-Configuration routine will detect which photo-sensors and MDR's are connected in order to configure a given module as a 1 or 2 zone controller. The physical order of module connections, from upstream to downstream, dictate the MDR direction and product flow logic. The following figures illustrate the pressing of the *INSTALL* button and the expected result of the Auto-Configuration routine. Please note that the red lines in the figure depict the crossover Ethernet cable connections.
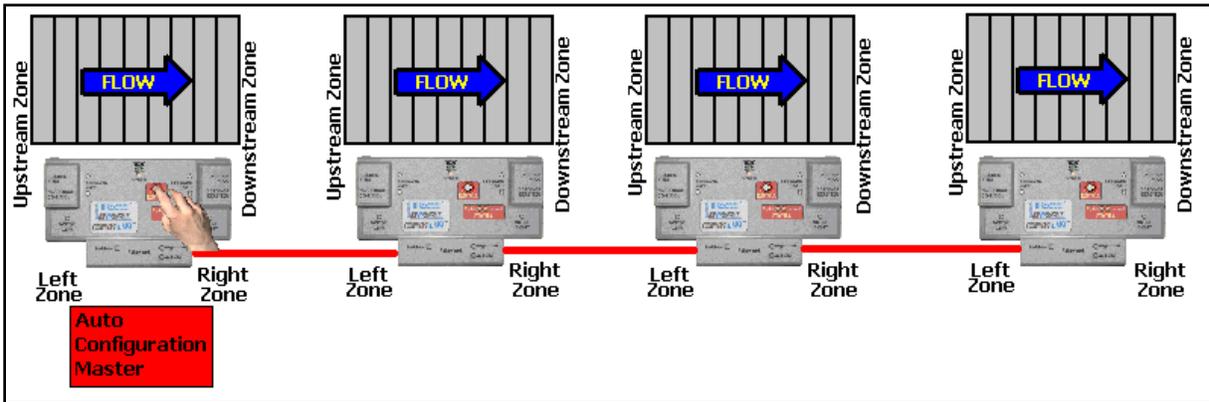


FIGURE 13 – SIMPLE AUTO CONFIGURATION EXAMPLE

Without changing any physical connections or cables; simply performing the same procedure at the opposite end of the conveyor path will re-configure all modules to operate in the reverse direction. This illustrates how the *Auto-Configuration Master* is easily changed by the Auto-Configuration procedure.
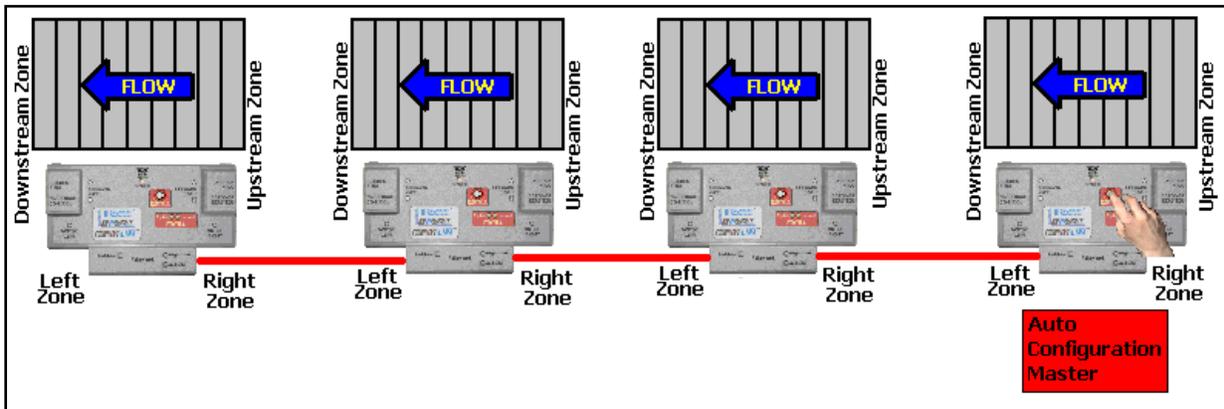


FIGURE 14 - SIMPLE AUTO CONFIGURATION EXAMPLE IN OPPOSITE DIRECTION

**Please note that number of *ERSC* modules on a single Subnet is limited to 220.**

## AUTO DETECTION OF OPPOSITE SIDE MODULE LOCATION

The cross-over cable connections between Left and Right Ethernet ports can be used in situations where the *ERSC* has to be mounted in the conveyor's opposite side frame.  If properly connected, the Auto-Configure routine will detect this and configure the conveyor flow properly.  This is illustrated in the following figure:
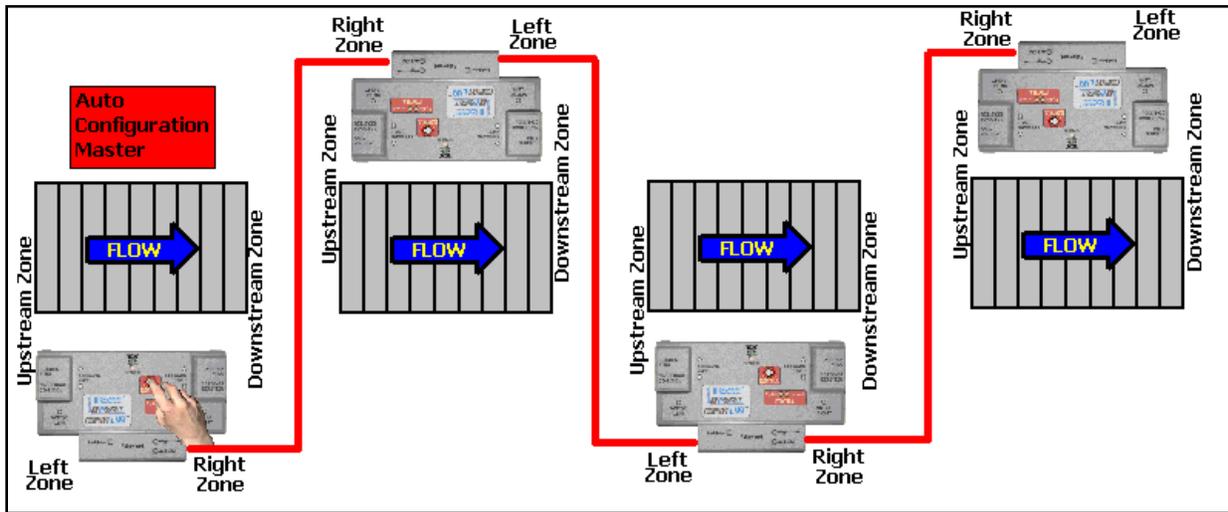


**FIGURE 15 - OPPOSITE SIDE MODULE LOCATION EXAMPLE**

## AUTO CONFIGURATION RESULTS

### NORMAL RESULTS

When the auto-configuration routine is complete, each *ERSC* will automatically reboot. When an *ERSC* has been successfully configured and rebooted, its *Module* and *Network Status* LED's (see **Error! Reference source not ound.** items 13 and 14) will blink on and off green.

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

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

|  | Please note that once a network has been configured; pressing and holding the *Install* button on any *ERSC* that is not the *Auto Configuration Master* will not initiate a new Auto Configuration procedure.  The *ERSC* will detect that it is not the most upstream unit and abort the procedure.  However the *ERSC* will perform its local re-booting procedure.  This procedure will take a few seconds to complete. |
|---|---|

### TROUBLE-SHOOTING FAILED AUTO-CONFIGURATION

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

| Failed Condition | Action |
|---|---|
| Status LED's OK with Unexpected Result | • Check that all photo-sensors are operational and that all zones are clear and perform procedure again.<br>• Check all networks, MDR, Sensor, and power connections and perform procedure again.<br>• Verify that all connections are valid.  Refer to section*Invalid* Configuration Examples on page 26.  Correct connections and perform procedure again. |
| Either or both Status LED's blinking or solid red on one or more modules | • Verify that there are no Ethernet Switches or PC's connected between *ERSC's*.  The Auto Configuration procedure will abort if a non-*ERSC* device is detected along the path before reaching the last node.  Modules up to that point will be configured, but the remaining modules will not.<br>• When removing an *ERSC* from an existing network that is already operational; be sure to wait at least 2 minutes to allow the Ethernet switches on the remaining *ERSC's* to reset before attempting a new Auto Configuration procedure. |

## DEFAULT CONFIGURATION

After a successful Auto Configuration, each *ERSC* will have the following default settings:

| Item | Default Value or Setting |
|------|--------------------------|
| MDR Type | Senergy ECO Roller |
| MDR Speed | 100% of rated motor PWM |
| Brake Method | Standard Dynamic |
| Acceleration Rate | 0.050 seconds |
| Deceleration Rate | 0 seconds |
| ZPA Mode | Singulation |
| Closed Loop | Disabled |
| T-Bone Accept Time | 0 seconds |
| Jam Timeout | 5 seconds |
| Run After Sensor Clear Timeout | 0.4 seconds |
| DIRECTION | CW |

These setting can be modified per individual *ERSC* zone and/or network wide by utilizing the *EasyRoll* software tool.  Please refer to section *EasyRoll Software Configuration Tool* starting on page 71 for definitions of these settings and procedures for their modification.

**You should also reference the self-help pop-up dialogues within *EasyRoll* for complete up to date definitions of pin-outs, functions and settings.**

## DEFAULT SINGULATION RELEASE ZPA MODE

Loads will normally convey from upstream zone to downstream zone in singulation release fashion.  With no Hardware Control connection on most downstream zone; load reaching last zone photo-sensor will cause last zone motor to continue to run to discharge load to next conveyor or position.  To control whether loads stop at most downstream zone, you must utilize one of the hardware interface methods described in section *Hardware Interface* on starting on page 45.

In *Singulation Release Mode*, each zone waits until the zone in front of it is clear before it is allowed to run.  This mode assures at least a zone-length of gap between loads as they are being conveyed.  When the first load needs to stop and cause all those behind it to accumulate; the trailing loads stop in their respective zones when their leading edge blocks the zone's photo-sensor. Figure 16 shows a typical example of singulation release.
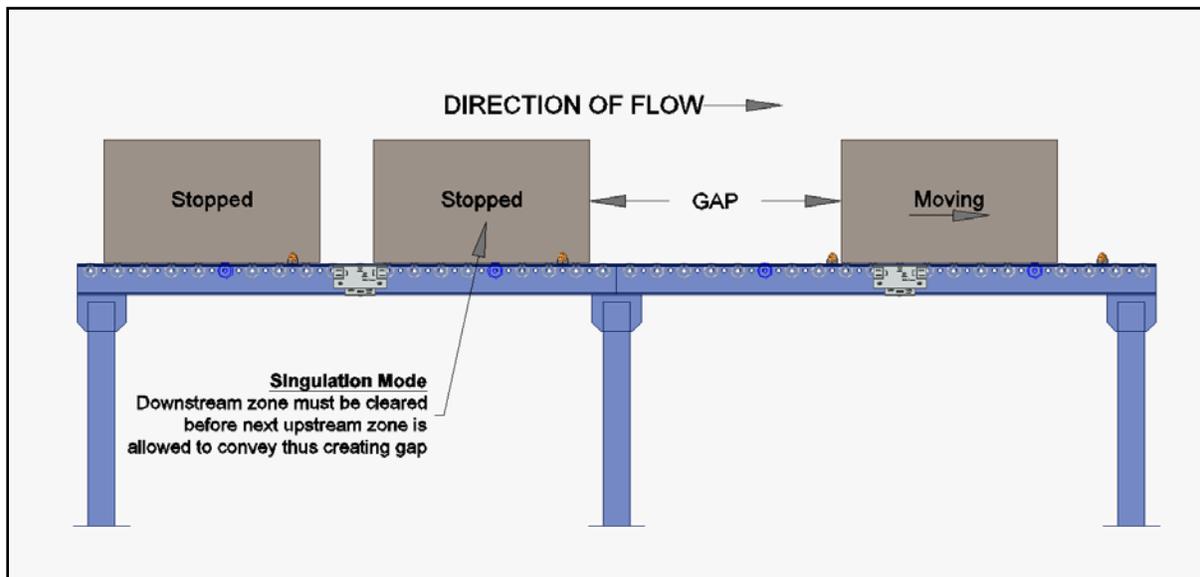


**FIGURE 16 - SINGULATION RELEASE EXAMPLE**

## DEFAULT FLEX ZONE RECOGNITION FEATURE

*ERSC* 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 operates for both singulation and train release modes.
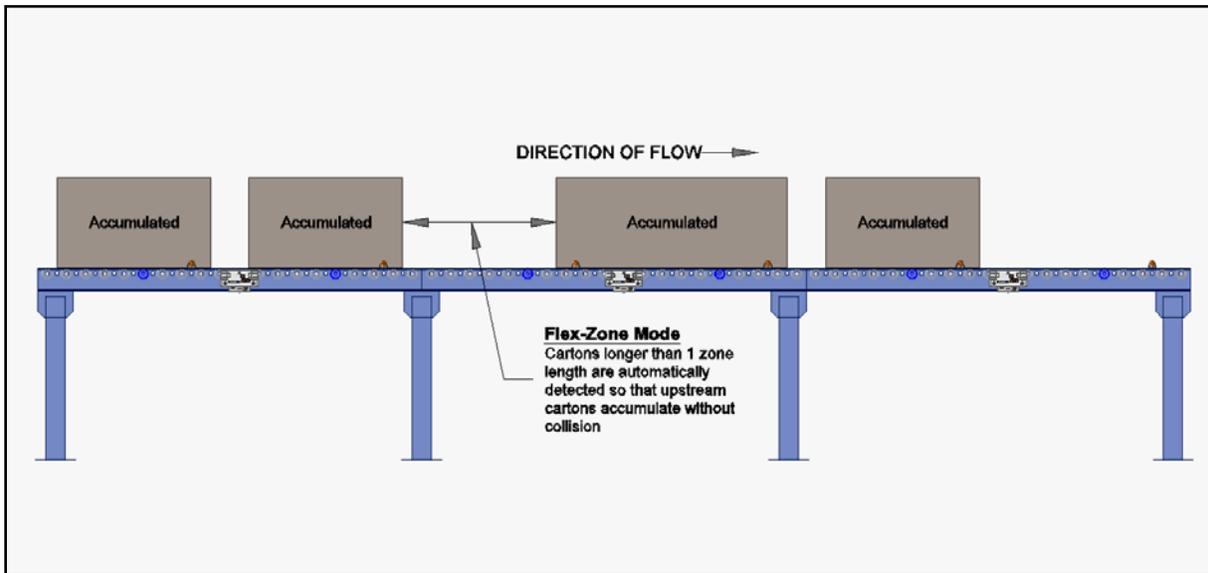


**FIGURE 17 - TYPICAL FLEX ZONE MODE EXAMPLE**

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

> ℹ Please refer to the integrated help inside *EasyRoll* for definitions and usage of the other available ZPA modes.

## JAM CONDITION

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

- Sensor Jam
- No Arrival Jam

### SENSOR JAM

If a load remains blocking the photo-sensor in an upstream zone after an attempt to move the load to its next downstream zone, the *ERSC* will detect a Sensor Jam.  This will be indicated as shown on chart in section *Sensors* on page 32.  In this case, if the load is cleared from the photo-sensor, the *ERSC* will automatically clear the Sensor Jam condition after the default 5 second Reset Timer expires.

After the Sensor Jam occurs and the sensor remains blocked; the *ERSC* will attempt to self-clear the Sensor Jam condition. First, the *ERSC* will run the affected zone's motor in reverse for up to 1 second in order to clear the blocked sensor. If the sensor is still blocked after this first reversing attempt, it will repeat this motion 2 more times. If the sensor becomes clear after any of these three attempts, the zone will return to normal function and the *ERSC* will attempt to convey the load downstream under normal ZPA control.

If the sensor remains blocked after three attempts of this motor reversing cycle; the zone will remain in Sensor Jam state and the load must be removed manually to reset the zone.

The default timer and the condition itself may be changed via the *EasyRoll.* Please refer to *Ignore* Jam Settings on page 86 or the integrated help inside *EasyRoll.*

### NO ARRIVAL JAM

When a load leaves an upstream zone and is conveyed to its next downstream zone, this upstream zone expects positive confirmation of load arrival from the downstream zone. This communication occurs automatically along the ConveyLinx network. If a new load arrives at this upstream zone while this upstream zone is waiting for a downstream arrival confirmation, the new load will accumulate on this upstream zone. If the upstream zone does not receive this confirmation within the Jam Timer interval, the *ERSC* will produce a No Arrival Jam fault. Once a No Arrival Jam occurs, the *ERSC* will automatically hold any new load at the upstream zone for a pre-determined Reset Timer value and then resume normal ZPA function. By default, the Jam Timer and the Reset Timer values are equal so that the maximum time a new load would remain accumulated in the upstream zone is 5 sec + 5 sec = 10 seconds.

The 5 second jam timer value is the default setting. Please refer to the integrated help inside *EasyRoll* for instructions on changing this value.

Please refer to *Ignore Jam Settings* on page 86 or the integrated help inside *EasyRoll* for help on changing the default logic to ignore a particular jam condition.

## NETWORK FAULT

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

## LOW VOLTAGE FAULT

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

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

## AUTOMATIC MODULE REPLACEMENT

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

**For ERSCs with firmware version 1.xx**:  Automatic Module Replacement will only work to replace an *ERSC* that is on a <u>single</u> *Subnet* network.  For multiple *Subnet* installations that share a single physical network; temporarily disconnecting all *Subnets* from the affected modules *Subnet* will be required.  Please refer to *Appendix B–Configuring PC for Ethernet Subnets* for a more detailed explanation of *Subnets*

**For ERSC's with firmware version 2.xx and 3.xx and higher:**  Automatic Module Replacement will work to replace an *ERSC* on multiple subnet installations without temporarily disconnecting any network connections.

## ERSC REPLACEMENT PROCEDURE

1. Disconnect existing module's motor(s), network, photo-sensor(s), hardware, and power connections. The order of disconnection does not matter.
2. Connect new module's motor(s), sensor(s), hardware, and network connections only. **DO NOT CONNECT POWER YET**.
3. Press and hold *INSTALL* button. **While holding** the *INSTALL* button pressed; **connect module power**.
4. Observe the Module Status LED. About 1second after applying power; the Module Status LED will start blinking red. DO NOT RELEASETHE INSTALL BUTTON YET. After another second, you will see that the Module Status LED will start to blink both RED and GREEN. This is the indication that the Auto Replace Procedure is starting and you MUST release the Install Button NOW. *Releasing the Install Button before you see the Module Status LED flashing both red and green will result in cancelling the Auto Replace Procedure.*
   a. Observation 1: A good indication that the Auto Replace Procedure is going on is that all sensor and control port LEDs will turn on solid red.
   b. Observation 2: During the Auto Replace Procedure, you will also observe that all modules on the network will briefly flash their sensor and control port LEDs. This is normal and they will return to normal operation within a few seconds.
5. Wait for at least 3 minutes before using the system or cycling power or plugging or unplugging any Ethernet connections. The module being replaced will automatically upgrade its firmware if needed and restore its configuration settings. This will involve multiple automatic restarts of the module. Do <u>NOT</u> cycle power to the module during this 3 minute period.
6. Once at least 3 minutes have passed and the new module is finished with its multiple restarting cycles, the new module should show that both its Module Status and Network LED's are blinking green. When both the Module Status and Network LED's are blinking green you are good to go.

# HARDWARE INTERFACE WITH CONTROL PORTS

Each *ERSC* module is equipped with a *Left Control Port* and a *Right Control Port*. Each of these is a 6 pin RJ-12 style socket. Each of these ports contains electrical connections for 2 logical inputs into the *ERSC* and 1 logical output controlled by the *ERSC*. The interpretation of the logical inputs by the *ERSC* on board logic and the meaning of the logical outputs controlled by the *ERSC* on board logic are based upon the conditions detected by the *ERSC* after the *Auto-Configuration* procedure.

Both *Control Ports* provide 2 overall functions for the *ERSC*:

- Local zone's accumulation control
- Module's upstream / downstream interlocking

The following sections describe the functionality of both ports and the *Auto-Configuration* conditions that dictate each port's interlocking configuration.

## LOCAL ZONE ACCUMULATION CONTROL

Both the *Left* and *Right Control Ports* have an input available that is reserved to provide local accumulation control for the given MDR zone. This input (Pin 3 on RJ-12 Hardware *Control Port*s) is PNP/NPN auto-sensing that will accept a simple contact closure (relay, selector switch, foot switch, etc.). When the contact is closed, the zone will accumulate any load that enters and occupies the zone and the load will not release regardless of the downstream conditions. When the contact is open, the zone will return to its normal mode of operation as dictated by its configuration. Figure 18 shows both ways to connect a contact signal to the accumulate input. Either connection method is acceptable and is logically identical to the *ERSC* module.

Local Accumulate control connection is intended for use in all ERSC zones **except the most upstream or most downstream**. Please use Upstream and Downstream Interlocks for the most upstream and downstream zones.
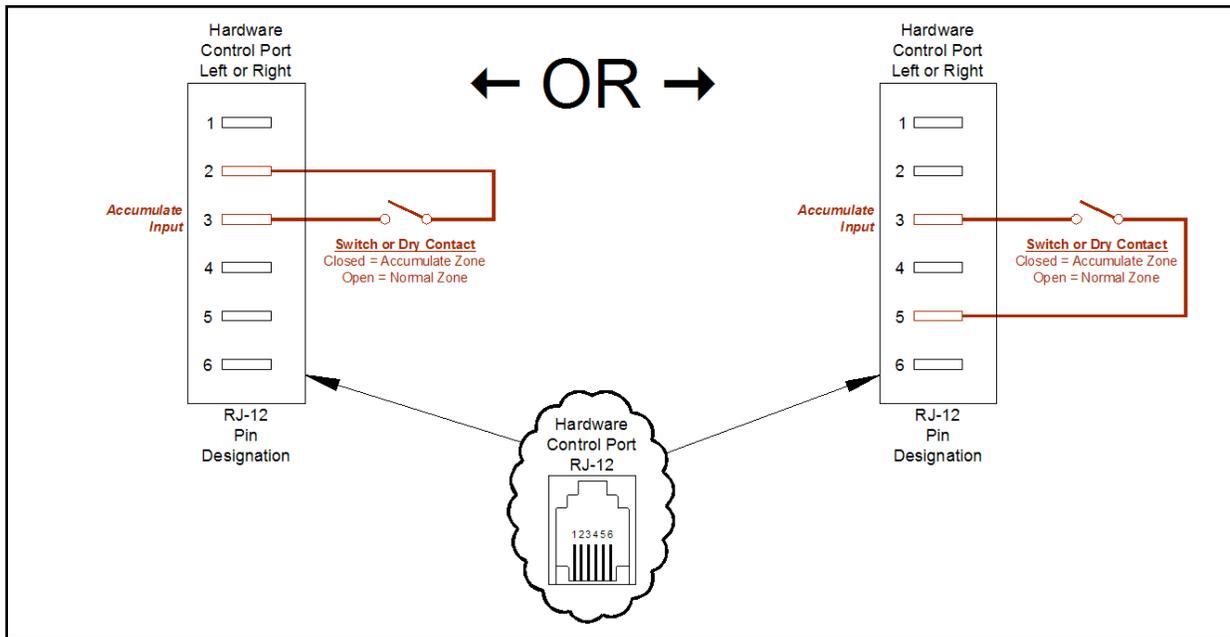
**FIGURE 18- ACCUMULATE CONTROL CONNECTION EXAMPLES**

Please note that if the accumulation control connection becomes closed while a load is in transit in a zone (MDR is running and load still blocking the photo-sensor); the *ERSC* will immediately stop the MDR and begin accumulation.

The "open" and "closed" states for the *ERSC Accumulate Input* signal shown above in Figure 18 are the default states.

Please refer to section Control Ports Configuration on page 105for instructions on how to invert the expected *ERSC Accumulate Input* signal for your specific application.

## CONTROL PORT INTERLOCK DEFINITION

*ConveyLinx* modules provide built-in logical interlock signals to be able to automatically interface with another *ConveyLinx* system or external hard-wired controls (such as push-buttons, relay contacts, or PLC's) for basic conveyor flow operation. This interlocking for the *Left Control Port* and *Right Control Port* can function in one of two ways:

- *Upstream Interlock*
- *Downstream Interlock*

The *Left Hardware Control* and *Right Hardware Control* ports automatically configure themselves as either an *Upstream Interlock* or *Downstream Interlock* based upon conveyor flow after the *Auto-Configuration* procedure. The logical function of both the *Upstream Interlock* and *Downstream Interlock* is exactly the same whether the hardwired connection to its respective *Control Port* is with a PLC or another *ERSC* module.

If the "Left" side of the *ERSC* module is controlling the most "upstream" zone with respect to conveyor flow, then the *Left Control Port* provides the *Upstream Interlock* function. Similarly, if the "Left" side of the *ERSC* module is controlling the "downstream" zone with respect to conveyor flow, then the *Left Control Port* provides the *Downstream Interlock* function. This same description applies to the *Right Control Port*. Figure 19 and Figure 20 show the resulting *Control Port* functions based upon direction of conveyor flow after an *Auto-Configuration* procedure.
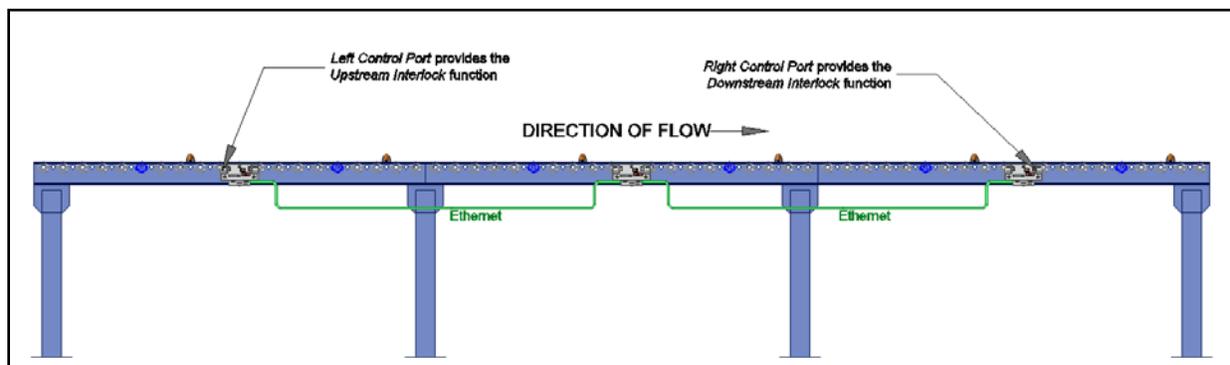

FIGURE 19 - CONTROL PORT ASSIGNMENT BASED UPON FLOW EXAMPLE
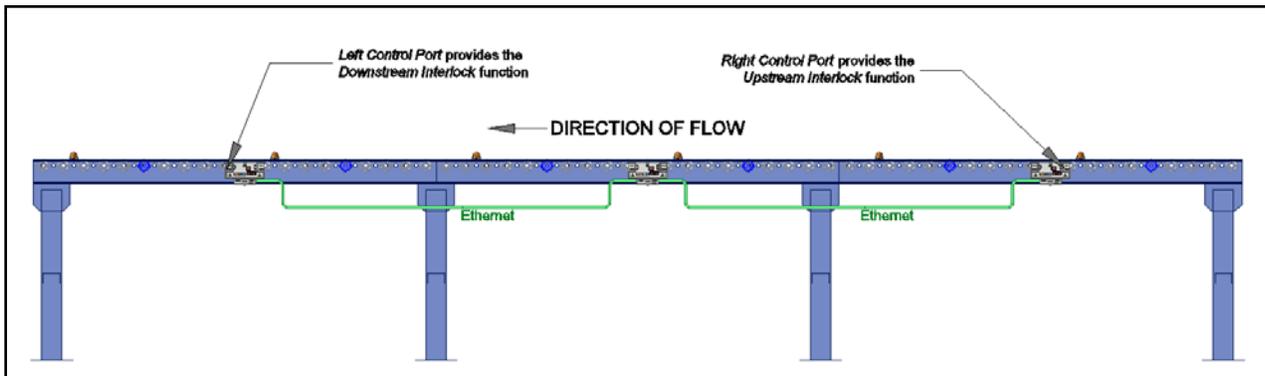
**FIGURE 20 - CONTROL PORT ASSIGNMENT EXAMPLE BASED UPON OPPOSITE FLOW DIRECTION**

The logical function of the *Upstream* and *Downstream Interlock* is identical regardless of whether a PLC is connected to the *Control Port*s or if another *ERSC* is connected to a *Control Port*.  The *ERSC* does not detect or otherwise determine if hardwired PLC or another hardwired *ERSC* is connected.

HARDWARE INTERFACE CABLE

Electrically, any *Control Port* on an *ERSC* module is designed to connect to any *Control Port* on another *ERSC* by using a properly configured RJ-12 cable assembly.  Various situations and conditions sometimes dictate that more than one *ConveyLinx* network is required for a given application.  One of these conditions, for example, is the limitation of 220 *ConveyLinx* modules that can share the same network domain.  In cases like these, one ConveyLinx network can seamlessly connect to a second ConveyLinx network via simple Hardware Interface Cable that allows the connected *ERSC*'s to exchange their respective *Upstream* and *Downstream Interlock* functions.  The discharge zone module's *Control Port* from one network is simply connected to the in-feed zone module's *Control Port* on the second network (or vice-versa) via a properly configured *Hardware Interface Cable*.  Figure 21 shows a typical conveyor arrangement for connecting two separate ConveyLinx networks together with a *Hardware Interface Cable*.  The two *ERSC*'s shown will simply exchange digital interlock handshake signals to allow for product to seamlessly convey from one network to the other.
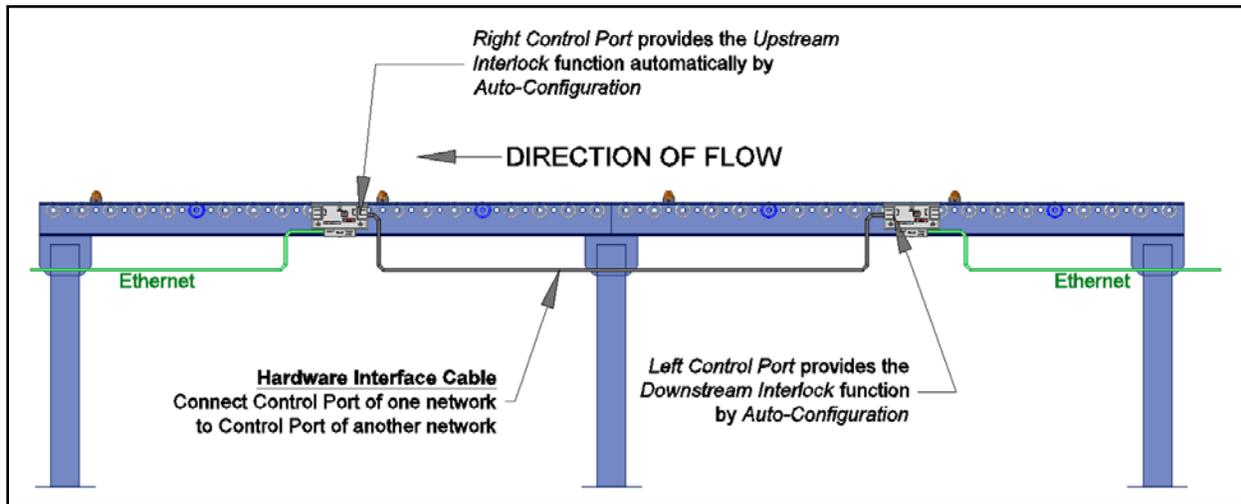
**FIGURE 21 - TYPICAL HARDWARE INTERFACE CABLE EXAMPLE**

Figure 22 shows the cable assembly detail for a *Hardware Interface Cable*. Please note that either end of this cable can be plugged into either *ERSC Control Port*.
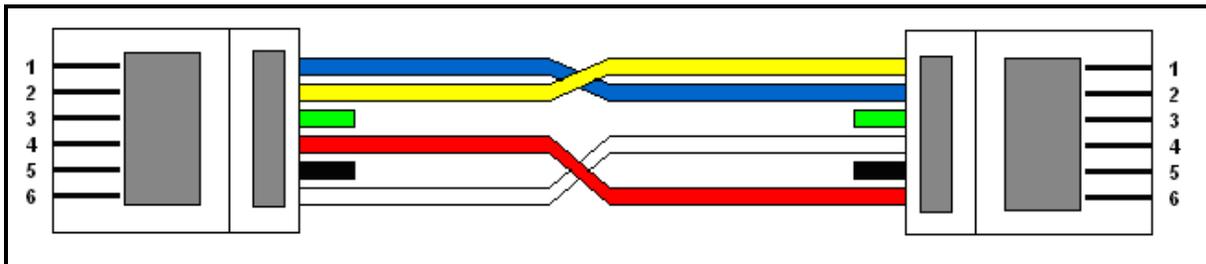


**FIGURE 22 - TYPICAL MODULE TO MODULE HARDWARE CONNECTION**

Cable connection and cable assemblies are identical for upstream or downstream module-to-module interlocks. *ConveyLinx* auto-detects functionality from internal configuration of conveyor flow, etc.

Refer to *Appendix C – ConveyLinx Accessories* for Insight Automation's line of available pre-manufactured cable assemblies and accessories.

Please note that a *Hardware Interface Cable* connection only exchanges discrete digital handshaking signals between the two networks of ConveyLinx modules. Ethernet-based information available from either network is not passed through this connection.

## SINGLE ZONE ERSC CONFIGURATION

Determining the *Upstream* or *Downstream Interlock* functionality for a given *Left Control Port* or *Right Control Port* is straight-forward when both the left and right zones of the *ERSC* are being utilized in a standard 2 zone configuration.

However it is likely that some conveyor sections in a typical conveyor system will only utilize one of the two available zones on an *ERSC* and that the other zone is not used at all (i.e. no MDR or Sensor plugged in). In these cases, the *Auto-Configuration* procedure still defines the *Upstream* and *Downstream Interlock* functions for a single zone *ERSC*. When an *ERSC* is configured as a single zone, the *Left Control Port* and the *Right Control Port* is affected by whether the single zone's one sensor is plugged into the *Left Sensor Port* or the *Right Sensor Port*.

|   |   |
|---|---|
| (info icon) | ***For a single zone ERSC; the physical side of the ERSC that the sensor is plugged will be the same side who's Control Port will provide the Upstream Interlock function and the opposite side's Control Port will provide the Downstream Interlock function.*** |

For example, if a single zone *ERSC* has its single zone sensor and MDR plugged into its Left Side; then the *Left Control Port* will provide the *Upstream Interlock* function and the *Right Control Port* will provide the *Downstream Interlock* function. Please note that this holds true regardless of which direction the conveyor is running. The *ERSC* side with the sensor is always the "upstream zone". An example configuration of a single zone *ERSC* with a Hardware Interface Cable connection is shown in Figure 23.
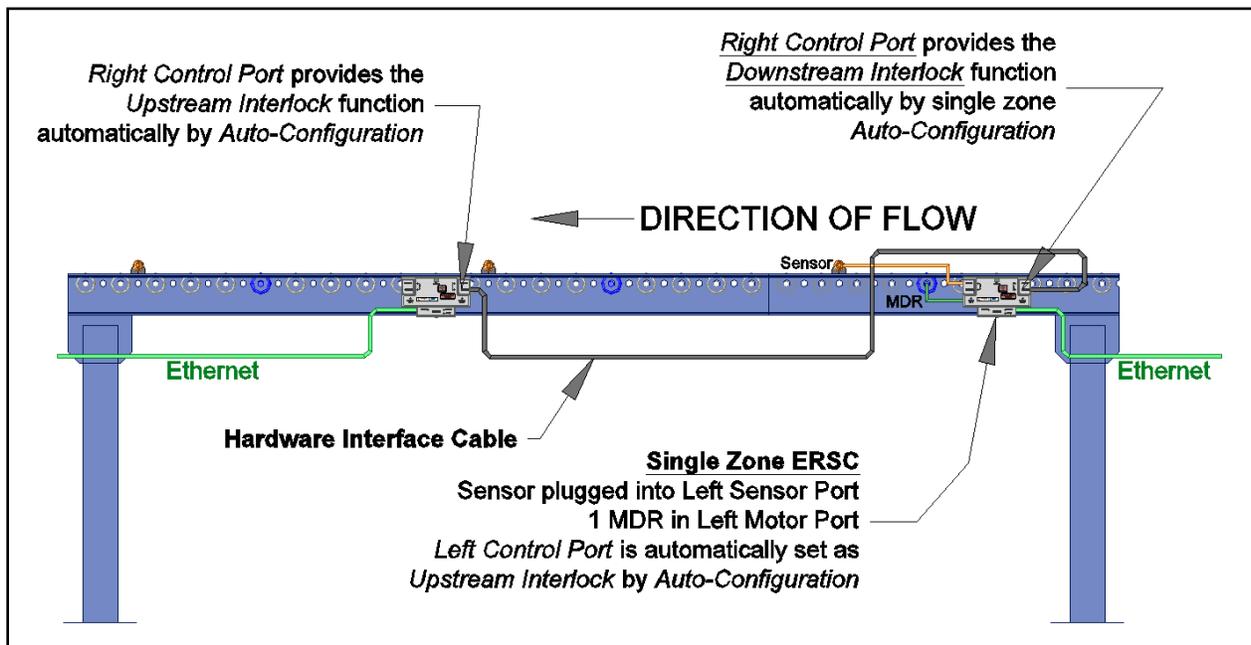


**FIGURE 23 - SINGLE ZONE HARDWARE INTERFACE EXAMPLE**

## USING SENSORS IN CONTROL PORTS

The *Left Control Port* and the *Right Control Port* are electrically very similar to the *Left* and *Right Sensor Ports* such that the *Control* port will power a photo-sensor and the photo-sensor's output connects to the *ERSC's* interlocking input. For certain basic applications, plugging a photo sensor into an *ERSC Control Port* can be used to stop product flow for *ERSC* controlled discharge zones and can be used to start or "wake-up" *ERSC* controlled in feed zones.

### SENSOR IN CONTROL PORT FOR DOWNSTREAM INTERLOCK
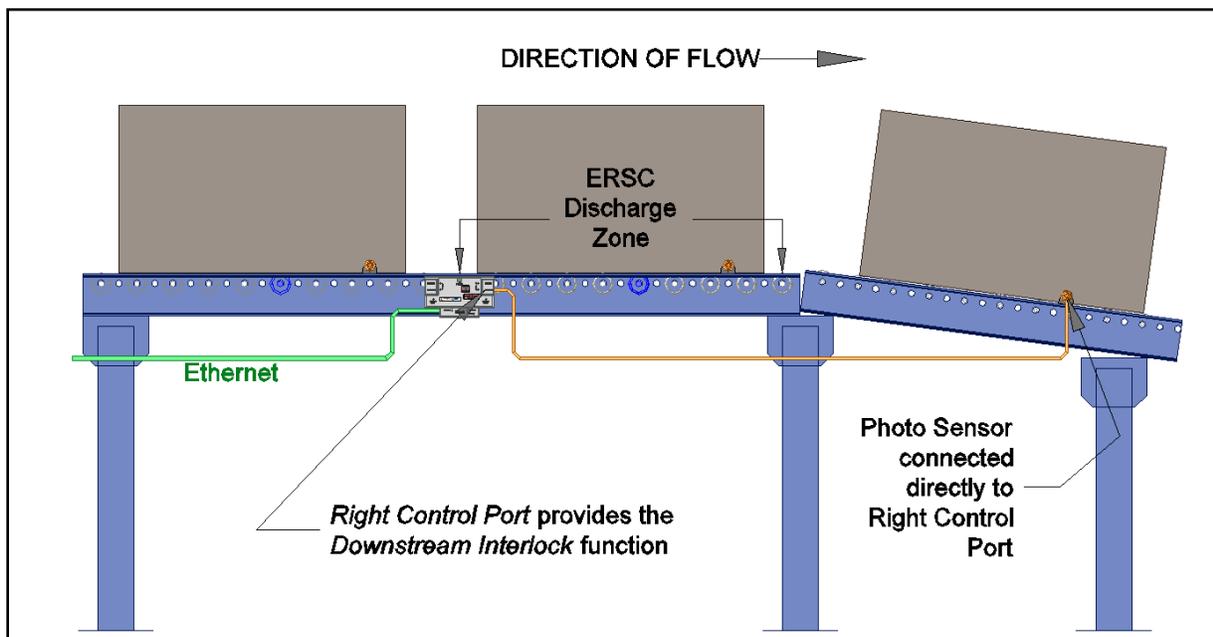


**FIGURE 24–SENSOR IN DOWNSTREAM INTERLOCK CONTROL PORT EXAMPLE**

Figure 24 shows a typical example where the application calls for the *ERSC* controlled discharge zone to accumulate a load when a downstream section (in this example a pitched gravity section) is occupied. In essence, the photo sensor plugged into the *Right Control Port* provides the "downstream occupied" signal to the *ERSC*. When the photo-sensor's output is energized, the *ERSC* interprets this condition as "downstream zone is occupied" and will thus accumulate any load that is conveyed into its discharge zone. If the photo-sensor's output is de-energized, then the *ERSC* will discharge the load from the last downstream zone.

Please note by pressing the F2 key within *EasyRoll* and clicking the "Control Ports" tab you will see the "Lane Full Interface" on the right. Activating the lane full interface effectively gives a block and clear time to the "Downstream occupied" signal to the ERSC which allows for common applications such as running MDR onto gravity conveyor or "other" conveyor types for a period of time.

UPSTREAM SENSOR IN CONTROL PORT
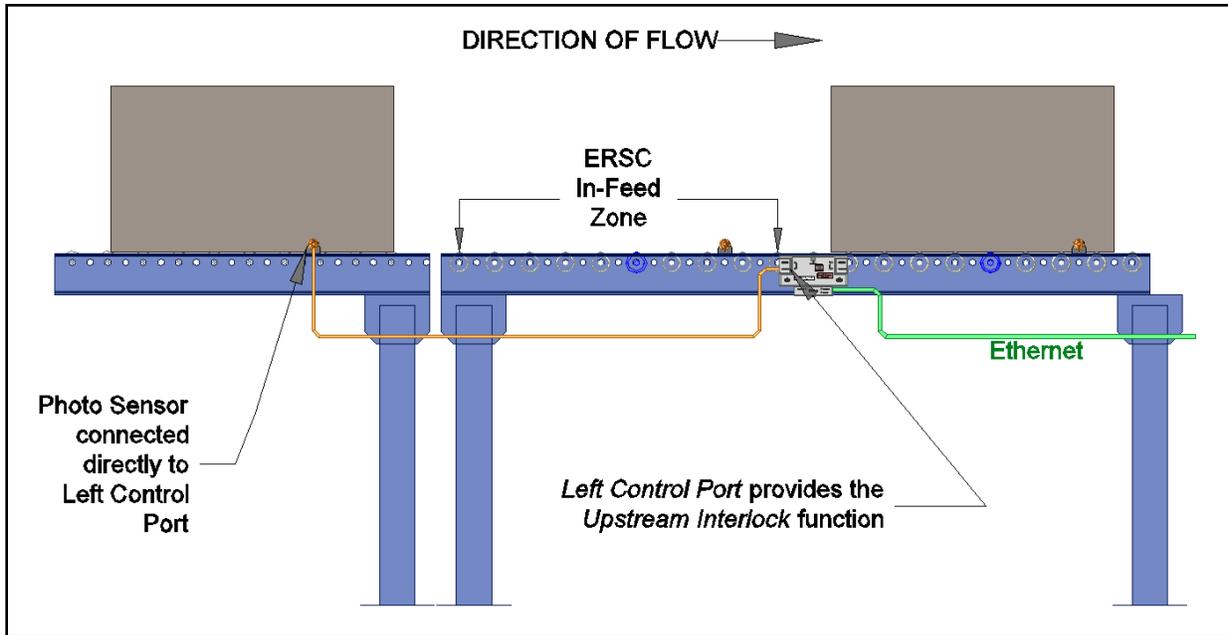


**FIGURE 25–SENSOR IN UPSTREAM INTERLOCK CONTROL PORT EXAMPLE**

Figure 25 shows a typical example where the application calls for the *ERSC* controlled in-feed zone to run to accept a load if an upstream sensor is blocked.  In essence, the photo sensor plugged into the *Left Control Port* provides the "upstream is sending" signal to the *ERSC*.  When the photo-sensor's output is energized, the *ERSC* interprets this condition as "upstream load is sending" and will thus begin to run its in-feed zone to accept the new load in transit.  If the photo-sensor's output is de-energized, then the *ERSC* will not run its in-feed zone.

Photo-sensor outputs can be either "light energized" or "dark energized" as well as being either "Normally Open" or "Normally Closed".  For both of the preceding examples of Sensors in Hardware  *Control Port*;  **the default configuration of** *ERSC's* **Control Port inputs is for the sensor's output signal to be** energized **when the zone is** occupied.

Please refer to section *Control Ports Configuration* on page 105 for instructions on how to invert the signal of the photo-sensor to indicate zone is occupied when sensor output is de-energized.

Please note that single zone configuration definitions and considerations as to which *Control Port*s are configured with the Upstream or Downstream Interlock functions still apply for photo-sensor connections to *Control Port*s.

Some photo sensors (particularly models that already include an RJ-11 / RJ-12 connector) utilize a separate "sensor health or light operate/dark operate" signal that resides on Pin 3 of the RJ connection.  If this type of sensor is used with an *ERSC Control Port*, the *ERSC* will interpret this signal on Pin 3 as an "unconditional accumulate" command and will cause the zone to operate as described in section *Local Zone Accumulation Control*on page 45.  If such a photo sensor energizes its sensor health when sensor health is "OK" or light operate/dark operate signal when

clear, then this sensor cannot be used with an *ERSC Control Port* because simply plugging it into a *Control Port* will cause its zone to unconditionally accumulate.  If such a sensor only energizes its sensor health signal upon a "Not OK" condition, then this photo sensor <u>may</u> be used with an *ERSC Control Port* with the understanding that a "not OK" health condition will cause the *ERSC* to unconditionally accumulate its *Control Port*'s zone.

## USING CONTROL PORTS WITH PLC I/O

Based upon the definitions for *Upstream Interlock* and *Downstream Interlock* made in previous sections, the following section will give description and logical timing chart examples that illustrate how the *ERSC Control Ports* will respond to externally wired PLC I/O.

Once *Auto-Configuration* is complete; each *ERSC Control Port* will be logically configured to provide either an *Upstream Interlock* or *Downstream Interlock*.

Regardless of a given *Control Port's* logical interlock designation (*Upstream* or *Downstream*); the input signal to the *Control Port* from external PLC Output is always connected to P4 of the *Control Port's* RJ-12 connection jack. Similarly, the output signal from a *Control Port* to external PLC input is connected between Pin 1 and Pin 6 of the *Control Port's* RJ-12 connection jack. An ERSC-SE4 Breakout Module simplifies this Interlock Connection by providing Screw Terminals labelled "Out" for the Control Port Output and P4 for the Pin 4 Input.

**Please refer to section *Electrical Connections for PLC Controls* beginning on page 59 for details on physical connection options for various PLC I/O configurations.**

### UPSTREAM INTERLOCK

When a *Control Port* is acting as the *Upstream Interlock*, the *ERSC* interprets a signal on its input Pin 4 as a command to begin running its upstream zone in order to accept product from an upstream source (conveyor or other equipment).  The *ERSC* output circuit on Pins 1 & 6 is energized when product is present on its upstream zone.  An ERSC-SE4 Breakout Module simplifies this Interlock Connection by providing Screw Terminals labelled "Out" for the Control Port Output and P4 for the Pin 4 Input.

This scenario is used when a PLC controlled conveyor needs to discharge a load onto the In-feed zone of the most upstream *ERSC* module of a *ConveyLinx* controlled conveyor as shown in Figure 26.
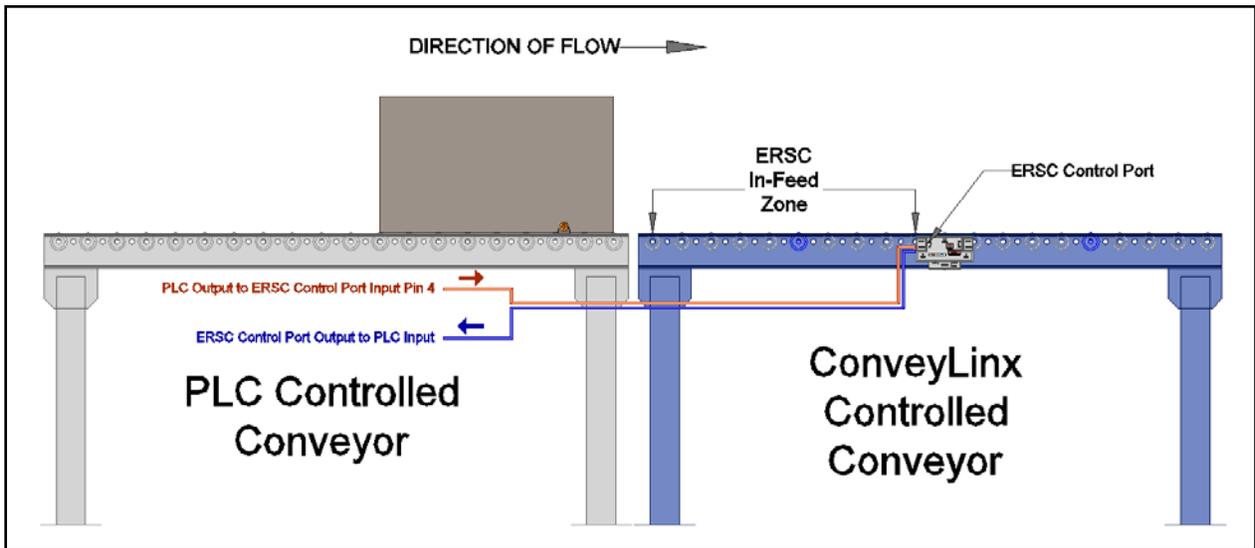
**FIGURE 26 - TYPICAL UPSTREAM CONVEYOR INTERLOCK EXAMPLE**

UPSTREAM INTERLOCK TIMING CHART

Figure 27 depicts timing chart for a typical *Upstream Interlock* exchange of signals over time.  Following Figure 27 is a listing of descriptions of the events from the timing chart.
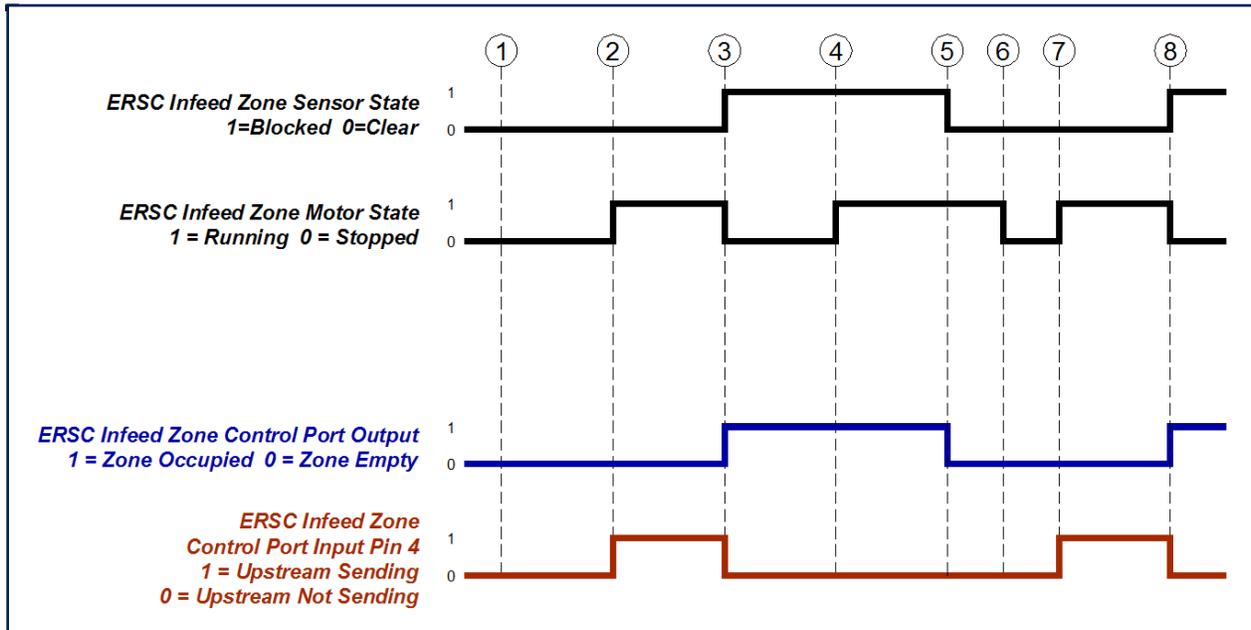


**FIGURE 27 - TYPICAL UPSTREAM INTERLOCK TIMING EXAMPLE**

| | Upstream Interlock Event Description |
|---|---|
| ① | Start with *ERSC* In-feed zone clear and ready to accept a load from upstream PLC controlled zoned conveyor.  PLC Input from *ERSC Control Port* output signal will be de-energized indicating that it is clear and ready to accept load. |
| ② | PLC controlled conveyor has a load ready to discharge onto *ERSC* in-feed zone.  *ERSC* is signaled via PLC Output connected to *ERSC Control Port* input Pin 4.  When this occurs, the *ERSC* will run its in-feed zone conveyor |
| ③ | In-feed zone sensor becomes blocked, In-feed zone motor is stopped and the *ERSC* energizes its *Control Port* output signal to indicate to PLC input that the zone is now occupied. |
| ④ | Assume that zone downstream of *ERSC* in feed zone is ready to accept a load; *ERSC* in-feed zone motor runs to convey load to next downstream zone as in normal ZPA operation. |
| ⑤ | In-feed zone sensor becomes clear and *Control Port* output is de-energized to indicate to PLC Input that in feed zone is empty.  Note that motor continues to run for a pre-configured run after sensor clear timer to assure load is completely conveyed from the in-feed zone. |
| ⑥ | Motor's run after sensor clear timer has expired and in-feed zone's motor is stopped |
| ⑦ | Repeat of ② |
| ⑧ | Repeat of ③ |

The logical "1" and "0" states for the *ERSC Input* and *ERSC Output* signals show above in Figure 27 are the default states.

Please refer to section *Control Ports Configuration* on page 105 for instructions on how to invert the expected *ERSC Input* and/or *ERSC Output* signals in order to customize functionality for your specific hard-wired / PLC application.

### DOWNSTREAM INTERLOCK

When a *Control Port* is acting as the *Downstream Interlock*, the *ERSC* interprets a signal on its input Pin 4 as indication that downstream conditions do not allow for product flow.  In this state, the *ERSC* will accumulate any product that arrives in its downstream zone. The *ERSC* output circuit on Pins 1 & 6 is energized when product is present on its upstream zone. A SE3 Module *(Control/Sensor Port Breakout Module, Output Amplifier, Optional Diodes Jumpers, and Timer)* simplifies this Interlock Connection by providing Screw Terminals labelled "Out" for the Control Port Output and P4 for the Pin 4 Input.

This scenario is used when a PLC controlled conveyor needs to accept a load in a singulating fashion from the discharge zone of the most downstream *ConveyLinx* module as shown in Figure 28.
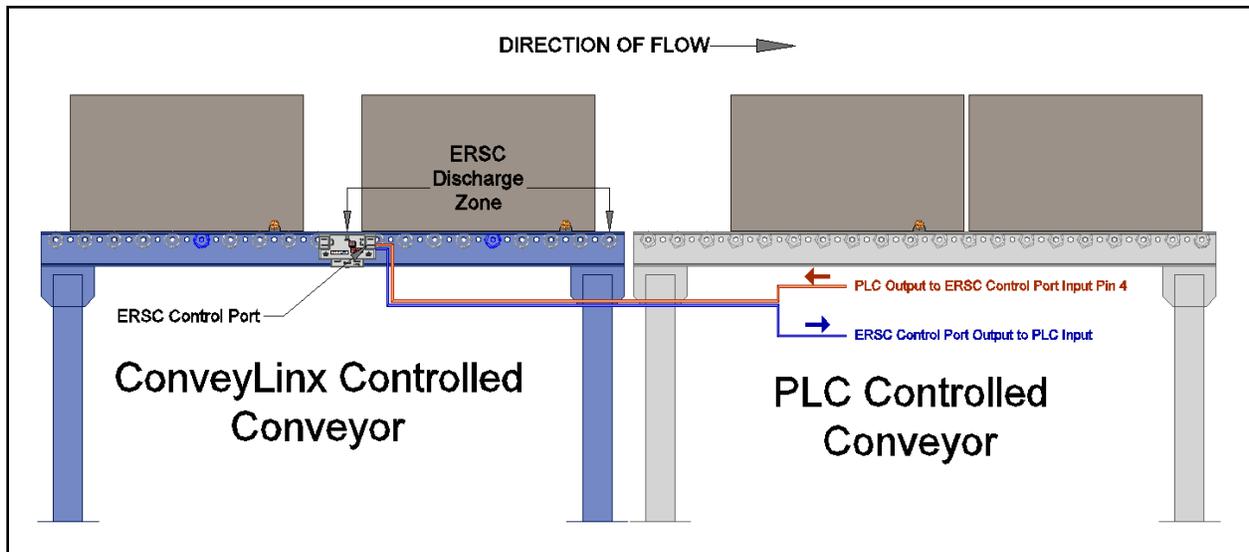


FIGURE 28 - TYPICAL DOWNSTREAM CONVEYOR INTERLOCK EXAMPLE

## DOWNSTREAM INTERLOCK TIMING CHART

Figure 29 depicts timing chart for a typical *Upstream Interlock* exchange of signals over time. Following Figure 29 is a listing of descriptions of the events from the timing chart.
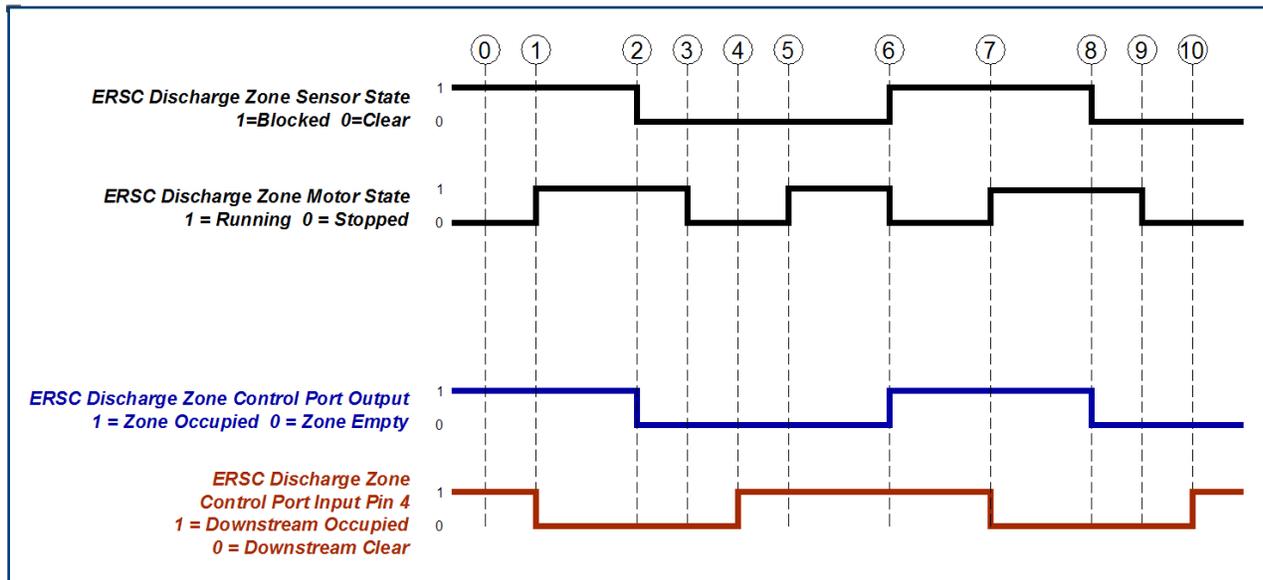


**FIGURE 29 - TYPICAL DOWNSTREAM INTERLOCK TIMING EXAMPLE**

| | Downstream Interlock Event Description |
|---|---|
| ⓪ | Start with *ERSC* Discharge zone and the PLC controlled accepting zone both occupied. *ERSC* Input Pin 4 is energized from PLC output indicating that PLC controlled accepting conveyor position is occupied. |
| ① | PLC de-energizes output to *ERSC Control Port* Input pin 4 indicating to *ERSC* that downstream position is ready to accept load. *ERSC* starts to run its discharge zone motor to convey load to PLC controlled conveyor. |
| ② | Load clears the *ERSC* discharge zone's sensor and *ERSC Control Port* output de-energizes indicating sensor is clear. *ERSC* continues to run the discharge zone motor for the pre-determined Run After time to assure load has completely conveyed from the zone. |
| ③ | *ERSC* discharge zone's Run After time has expired and the zone motor is stopped. |
| ④ | PLC energizes output to *ERSC Control Port* Pin 4 to indicate successful arrival on PLC controlled conveyor. PLC keeps this energized as long as PLC controlled conveyor is not ready to accept a new load. |
| ⑤ | Assume that *ERSC* needs to convey a load into its discharge zone. *ERSC*'s discharge zone motor runs to accept load from its upstream zone under normal ZPA control. |
| ⑥ | Load conveying from *ERSC*'s upstream zone arrives at its discharge zone sensor and the discharge zone motor is stopped. *ERSC* also energizes its *Control Port* output indicating that the discharge zone is now occupied. |
| ⑦ | Repeat of ① |
| ⑧ | Repeat of ② |
| ⑨ | Repeat of ③ |
| ⑩ | Repeat of ④ |

Under normal operation, the time duration between steps ② and ④ must not be greater than the *ERSC*'s configured Jam Timer setting.  If this time duration is greater than the configured Jam Time setting, the *ERSC* discharge zone will produce a No Arrival Jam fault.  The *ERSC* discharge zone will also produce a No Arrival Jam fault if the PLC does not energize *ERSC Control Port* Pin 4 within the same Jam Time interval.

Please refer to section *Jam Condition* on page 40 for full description of the No Arrival Jam condition.

Please refer to section *Jam, Auto Clear,& Run After Timers*on page 95 for instruction on changing the default Jam Timer setting for the discharge zone.

The logical "1" and "0" states for the *ERSC Input* and *ERSC Output* signals show above in Figure 29 are the default states.

Please refer to section *Control Ports Configuration* on page 105 for instructions on how to invert the expected *ERSC Input* and/or *ERSC Output* signals in order to customize functionality for your specific hard-wired / PLC application.

Discharge hardware interlock only functions in Singulation Release Mode.  Train Release Mode is not enabled for a discharge interlock.  Please refer to section

*Default Singulation Release* ZPA Mode on page 39 for description of this mode of operation.

## ELECTRICAL CONNECTIONS FOR PLC CONTROLS

Both Upstream and Downstream electrical connections are the identical.  Logically, the *ERSC* module is expecting a single logical **Input** from a **PLC Output** and provides a single logical **Output** to a **PLC Input**.  The *ERSC* module automatically configures the logical meaning of each logical signal depending on whether the interlock is *Upstream* or *Downstream*.

### CONNECTIONS FOR ERSC OUTPUT TO PLC INPUT

These connection configurations are the same for both Upstream and Downstream scenarios for either the Left or Right Hardware *Control Port*.

#### SINKING PLC INPUT

Figure 30 shows a typical connection between a ConveyLinx *ERSC* module's *Control Port* and a 24VDC sinking type PLC Input card.
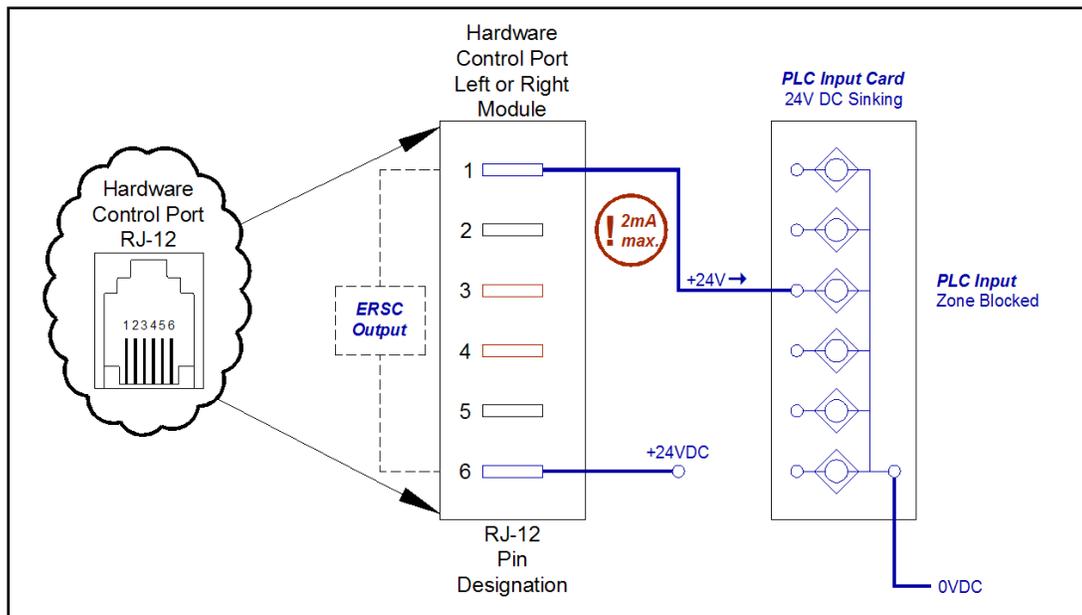


FIGURE 30–SINKING PLC INPUT FROM ERSC CONTROL PORT OUTPUT

⚠️ Please refer to section
*Using ERSC-SE4 Terminal Breakout* Module on page 66 for details on utilizing *ERSC*-SE breakout terminal board for applications requiring a higher current *ERSC* output.

## SOURCING PLC INPUT

Figure 31 shows a typical connection between a ConveyLinx *ERSC* module's *Control Port* and a 24VDC sourcing type PLC Input card.
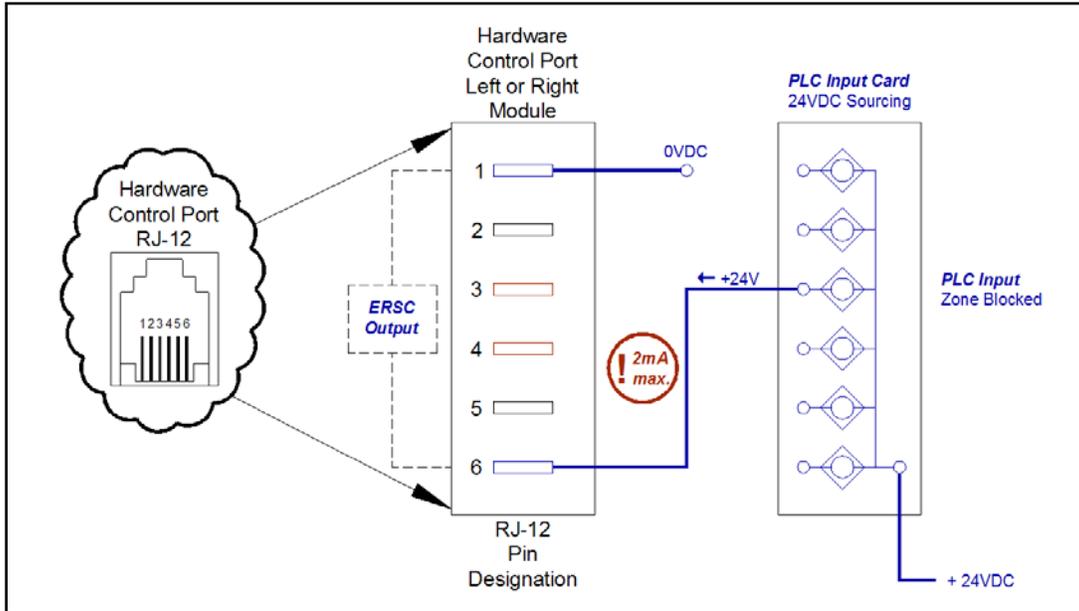


**FIGURE 31 - SOURCING PLC INPUT FROM ERSC CONTROL PORT OUTPUT**

*ERSC* output circuit is <u>**VERY LOW POWER**</u> and provides only approximately <u>**2mA**</u> current for either sinking or sourcing connections.  PLC input module must accommodate lower power requirement.

Please refer to section

*Using ERSC-SE4 Terminal Breakout* Module on page 66 for details on utilizing *ERSC*-SE4 breakout terminal board for applications requiring a higher current *ERSC* output.

## CONNECTIONS FOR PLC OUTPUT TO ERSC INPUT

These connection configurations are the same for both Upstream and Downstream scenarios for either the Left or Right Hardware *Control Port*.

Note that **Figure 32, Figure 33, Figure 34, and Figure 35** show both the Local Accumulate and Interlock Inputs being connected to the same control port to PLC I/O.  This is shown for clarity to illustrate that both signal are connected to a PLC in a similar way to an external PLC and that typically **only one or the other would actually connect for any given ERSC.**

In normal applications, the **Interlock** Input is **only used** on the **most upstream or downstream zones** and the **Local Accumulate** Input is **only used** for **intermediate zones**.  You may get unexpected results by failing to follow this convention.

### SOURCING PLC OUTPUT TO ERSC INPUT

Figure 32 shows a typical connection between a ConveyLinx *ERSC* module's *Control Port* and a 24VDC sourcing type PLC Output card.
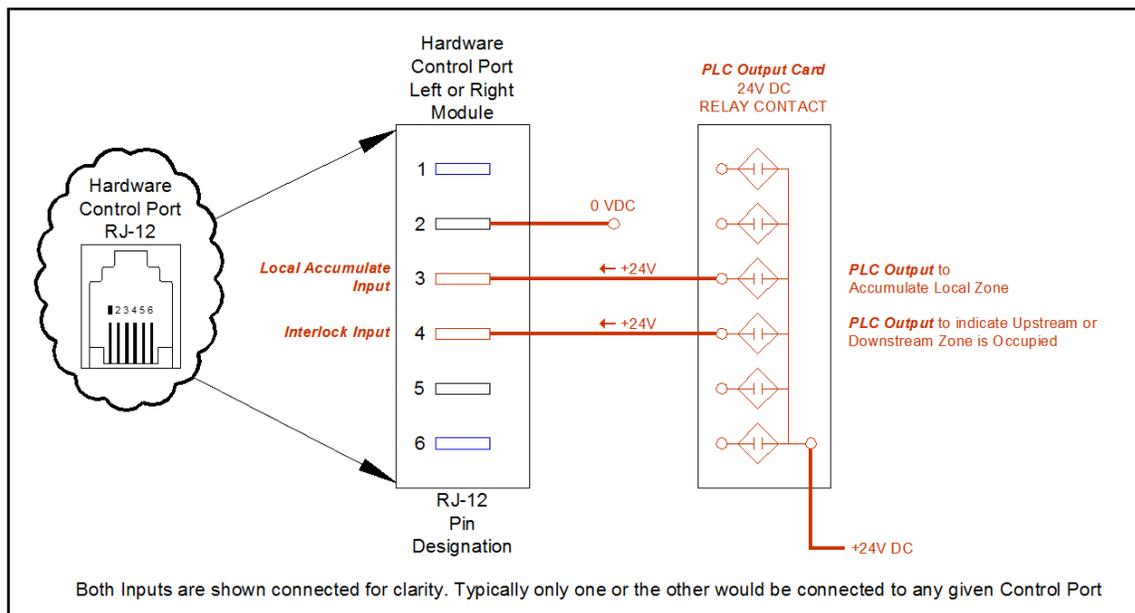


**FIGURE 32 - SOURCING PLC OUTPUT TO SINKING ERSC CONTROL PORT INPUT**

Please note that PLC Output connection to Local Accumulate Input is optional and is shown for reference only to point out that local accumulation control can easily be provided by a PLC output.

Please refer to section

*Using ERSC-SE4 Terminal Breakout* Module on page 66 for details on *ERSC-SE4* module interface to Control Port for screw terminal connections to access the P3 and P4 pins of the RJ12 Port

### SINKING PLC OUTPUT TO ERSC INPUT

Figure 33 shows a typical connection between a ConveyLinx *ERSC* module's *Control Port* and a 24VDC sinking type PLC Output card. See the examples of

Using ERSC-SE4 Terminal Breakout Module with ConveyLinx and other interfaces on page 66.
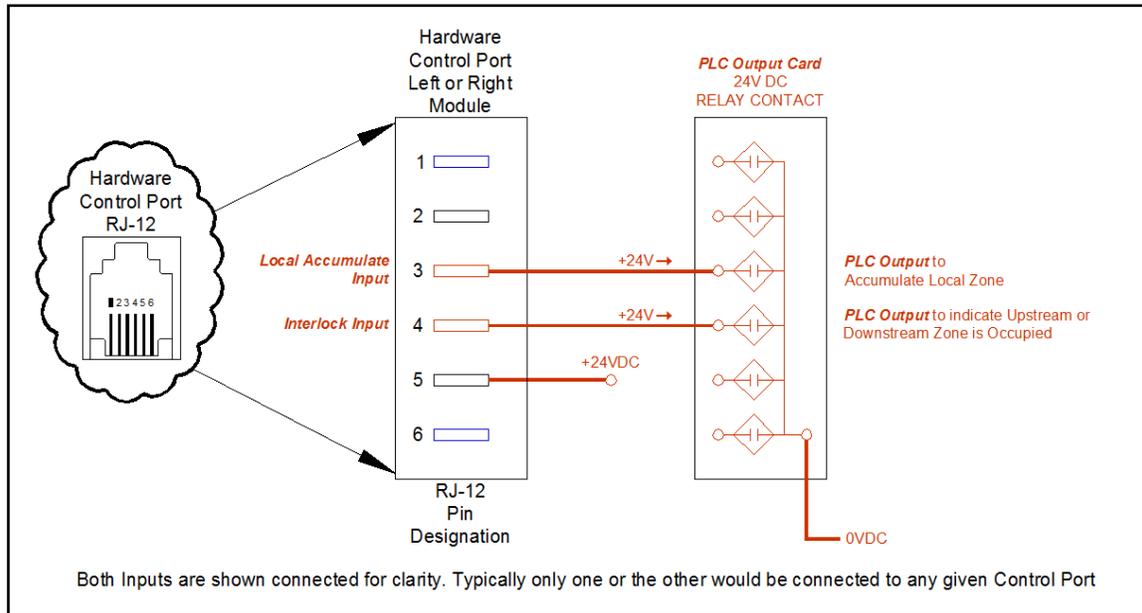


**FIGURE 33 - SINKING PLC RELAY CONTACT OUTPUT TO SINKING ERSC CONTROL PORT INPUT**

Please note that PLC Output connection to Local Accumulate Input is optional and is shown for reference only to point out that local accumulation control can easily be provided by a PLC output.

PLC output modules **MUST BE RELAY OR CONTACT** style regardless of sourcing or sinking operation.  Utilizing solid state PLC output modules may result in unexpected results under conditions where the solid state PLC module can be powered off while it's connected *ERSC* remains powered.

Please refer to section *Utilizing Solid State PLC Output Modules* beginning on page 63 for details on using solid state PLC output modules for connections to *Control Port*s.

Please refer to section

Using ERSC-SE4 Terminal Breakout Module on page 66 for details on ERSC-SE module interface to Control Port for screw terminal connections to access the P3 and P4 pins of the RJ12 Port.

UTILIZING SOLID STATE PLC OUTPUT MODULES

*ERSC Control Port* inputs utilize an auto-detecting PNP/NPN circuit.  To make this auto-detecting feature operate, there is a residual voltage always on the circuit.  For certain solid state PLC Output modules, when power is removed from the output module while the *ERSC* remain powered, the *ERSC*'s input circuit can find a reverse current path through the solid state PLC output module such that the *ERSC* would interpret that its input is energized.  If substituting the solid state module with a relay or contact type PLC output module is not an option;

the solution is to insert a blocking diode in series into the circuit for each *ERSC* input so that this reverse current does not have a circuit path.

There are two means of accomplishing this:

- Provide and install diodes as shown in  below
- Utilize an SE2 or greater Module RJ-12 terminal breakout module with integrated diode circuit

The connection polarity of the diode is dependent upon whether the solid state PLC output module is a sourcing type or sinking type. Figure 34 and Figure 35 show the connection polarity of the blocking diode for sinking and sourcing solid state PLC output modules respectively.
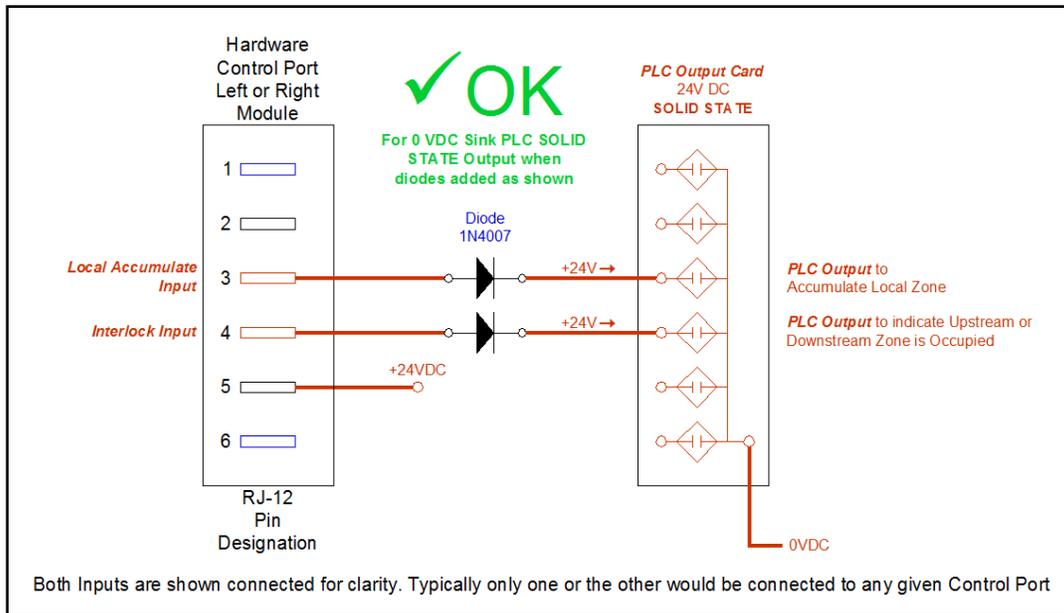


**FIGURE 34 - DIODE CONNECTION POLARITY FOR SOLID STATE SINKING OUTPUT MODULE**
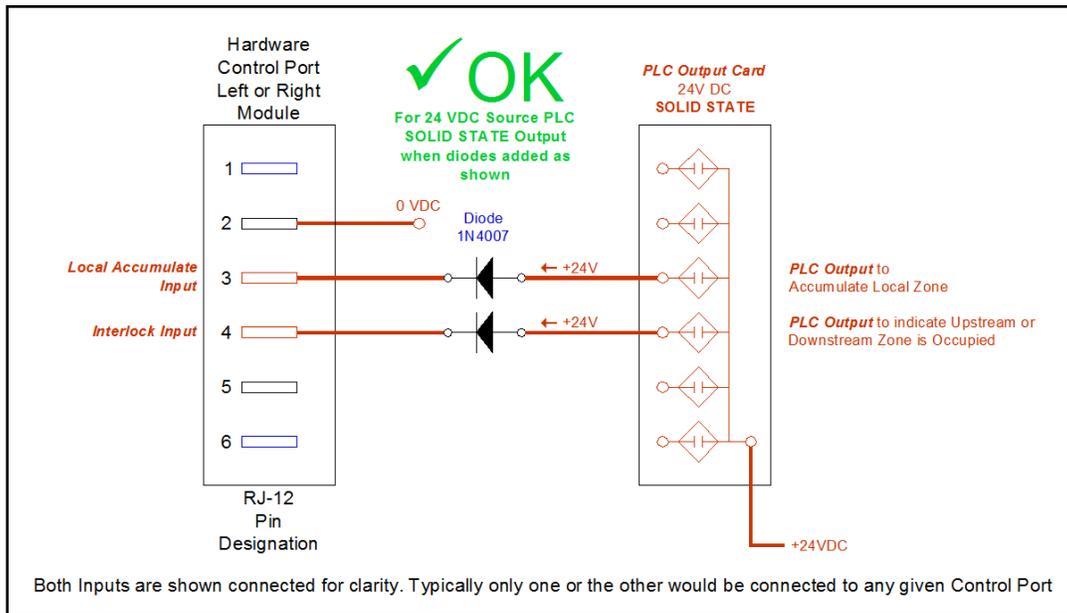
**FIGURE 35 - DIODE CONNECTION POLARITY FOR SOLID STATE SOURCING OUTPUT MODULE**

## USING ERSC-SE4 TERMINAL BREAKOUT MODULE

Please note that this section describes the latest version of the breakout module which is the ERSC-SE4.  Please refer to *Appendix C – ConveyLinx Accessories* for details on the previous versions of the ERSC-SE series modules.

Insight Automation part number ERSC-SE4-Kit is a small module that provides a RJ-12 cable jack breakout to screw style wiring terminal blocks.  In addition to providing simple wiring connectivity to the *ERSC*'s RJ-12 pins, the ERSC-SE4 also provides blocking diodes for both the Local Zone Accumulate input signal (Pin 3) and the Interlock input signal (Pin 4).  The SE4 modules diodes are equipped with user settable jumpers to allow configurations for both sourcing and sinking solid state PLC output modules.  The ERSC-SE4 also includes an amplifier for the *ERSC* output circuit (Pin 1 and Pin 6) to allow up to 100mA of current load.  This feature will allow the *ERSC* output to drive a small inductive load such as a relay coil as well as a PLC input.  Because of current restrictions on each pair of Sensor and Control Ports (see section

*Sensor and Control Port* Fusing on page 21), you can optionally connect an external +24V power source to the "+24V" terminal on the SE-4 to provide power to devices connected to the SE-4.  Without this external power source, the current limit is 100mA on devices powered from the 24V terminal.  The SE-4 contains blocking diode on this terminal to prevent external power source from connecting to the ERSC's power bus.  Figure 36 shows a typical ERSC-SE4 cable connection.
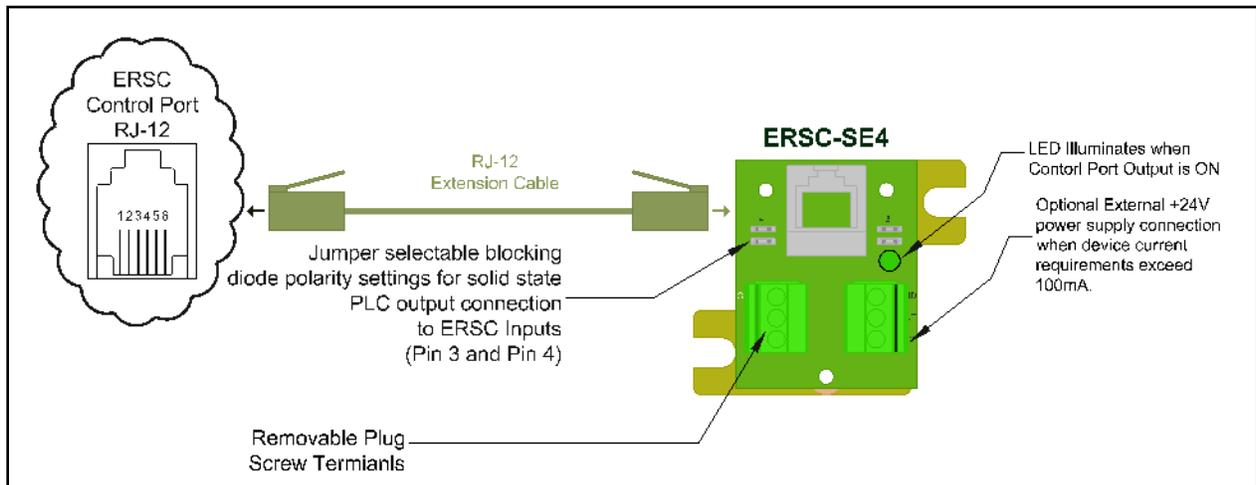


**FIGURE 36 - ERSC-SE EXAMPLE**

TYPICAL OUTPUT CONNECTION

Figure 37 shows the typical connection for a device to the *ERSC*'s *Control Port* output circuit.  Please note that with the SE-4 the OUT terminal only supplies a +24V signal when energized.
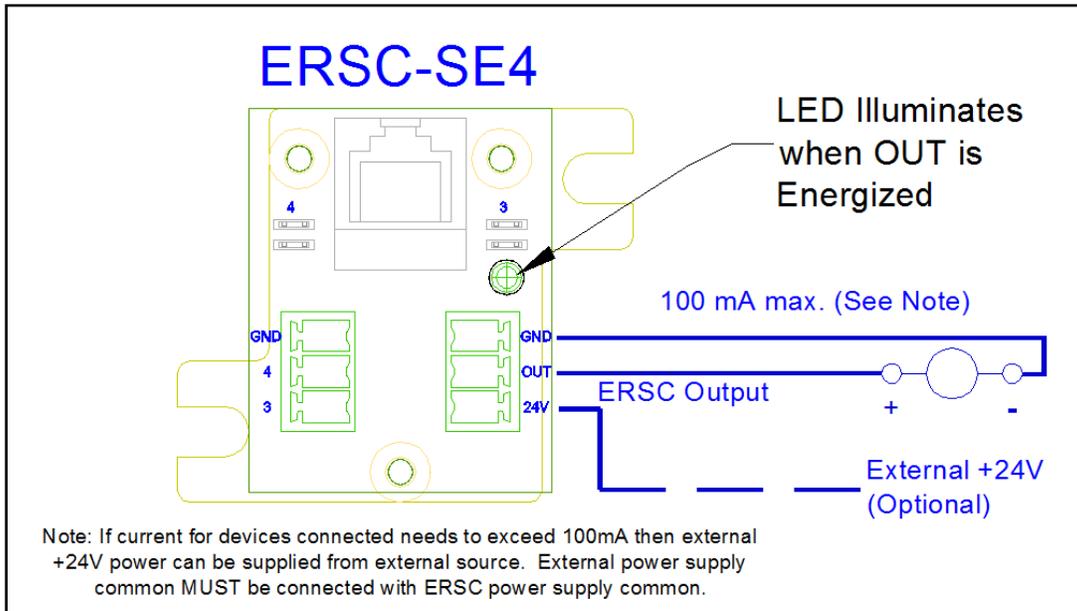


FIGURE 37 - TYPICAL ERSC OUTPUT CONNECTION EXAMPLE

## INPUT CIRCUIT BLOCKING DIODE JUMPERS

Figure 38 shows the diodes jumper configuration for the ERSC-SE4 modules. When both Jumpers are installed then electrical current can move to and from the ERSC card. Removing jumper 2*(bottom)* for pin 3 or 4 results in keeping an external device ("Sinking" *PLC output or Sensor*) from leaking current back into the ERSC's input. This is beneficial when a solid state output or sensor is leaking current into the ERSC's input keeping it in an on state regardless of the output or sensor actual state. See Figure 39 or Figure 40 for further details. Removing Jumpers 1 and 3 does the same thing as above except for a Solid State "Sourcing" output.
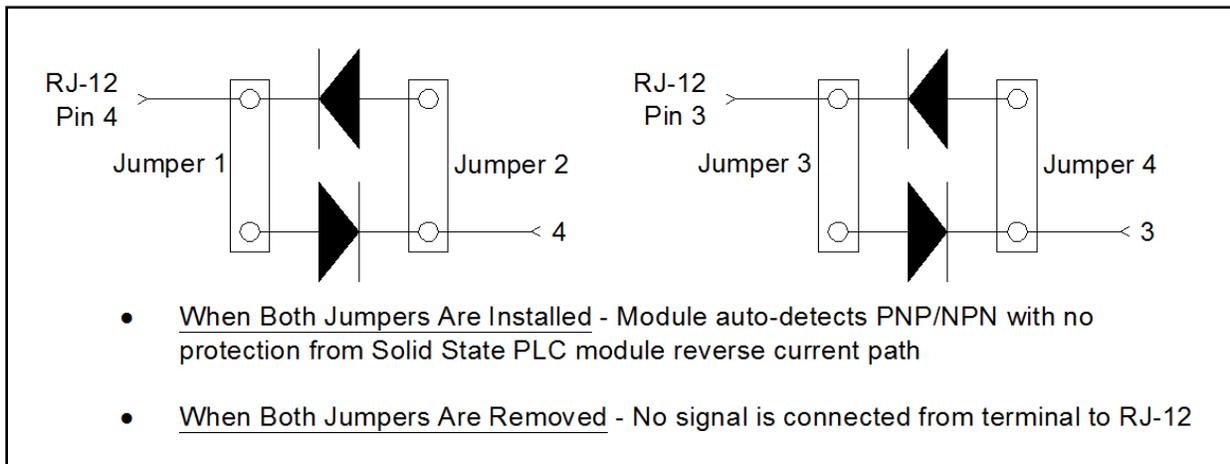


**FIGURE 38 – JUMPER LAYOUT FOR SE MODULE**

Figure 39 shows the jumper configuration and typical wiring diagram to connect a solid state sourcing type PLC output card to *ERSC Control Port* inputs. This diagram produces the same diode polarity result as is depicted in Figure 35.
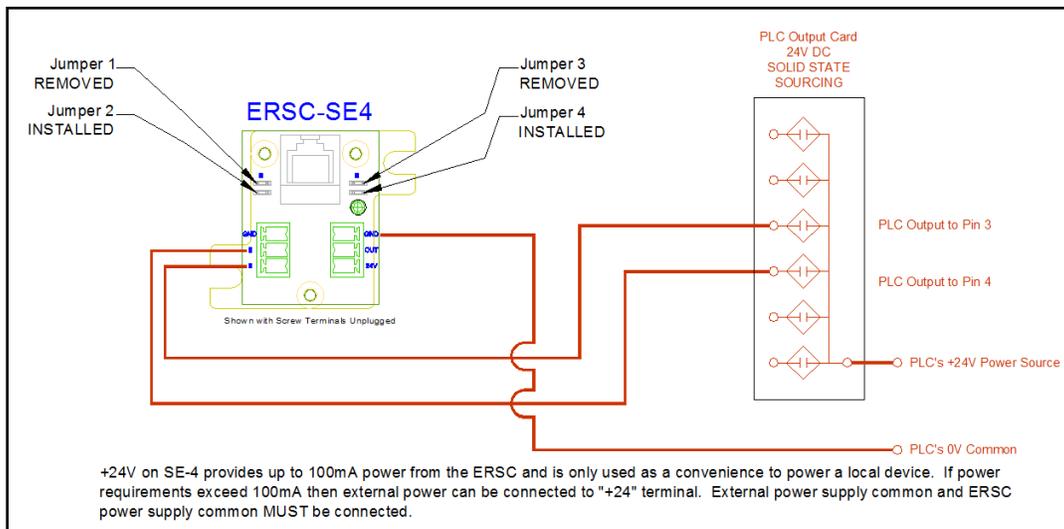


**FIGURE 39 - TYPICAL PLC SOURCING OUTPUT CONNECTION TO ERSC INPUTS**

Figure 40 shows the jumper configuration and typical wiring diagram to connect a solid state sinking type PLC output card to *ERSC Control Port* inputs. This diagram produces the same diode polarity result as is depicted in Figure 34.
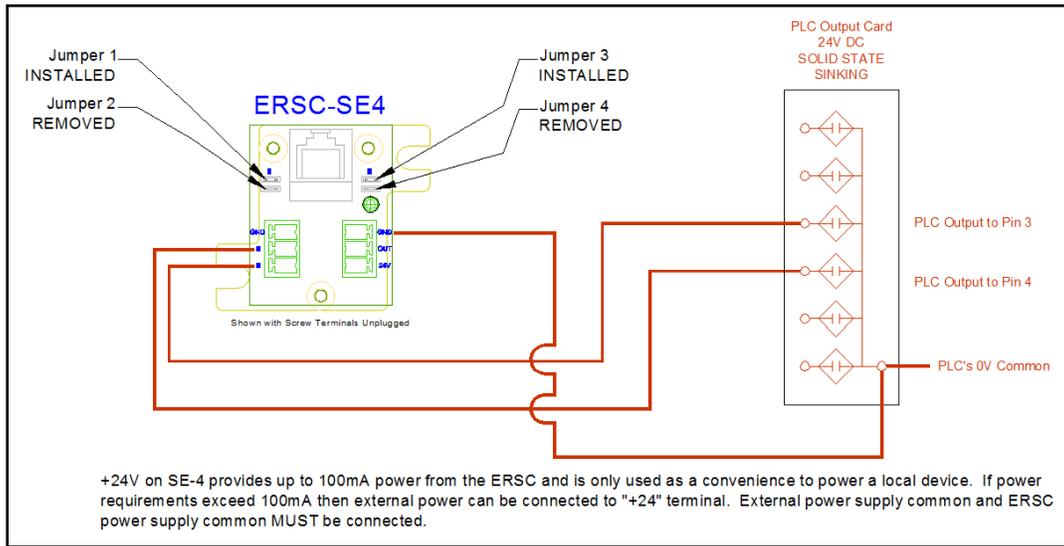


**FIGURE 40 - TYPICAL PLC SINKING OUTPUT CONNECTION TO ERSC INPUTS**

⚠ *ERSC* output circuit from ERSC-SE4 provides a +24V PNP (source) connection only. When the *ERSC* logically energizes the output; the "OUT" terminal provides +24VDC.

# EASYROLL SOFTWARE CONFIGURATION TOOL

## INTRODUCTION

The *EasyRoll* Software Configuration Tool is a PC based application that provides an alternative means to configure a *ConveyLinx* controlled conveyor system. *EasyRoll* also provides the ability to change *ConveyLinx* module default parameters that are otherwise not accessible from the module's built-in *Auto-Configuration* routine.

### BASIC FEATURES

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

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

*EasyRoll* provides the ability change these parameters for a single module or a group of modules all at once.

*EasyRoll* has the ability to display the status information for any *ConveyLinx* module on the network's subnet.

*EasyRoll* has the ability to display more in-depth status information by clicking on the graphic of the connected module.

### ADVANCED FEATURES

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

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

## INSTALLING EASYROLL TOOL ON YOUR PC

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\".

## CONVEYLINX ETHERNET DEFINITION

Please refer to *Appendix B–Configuring PC for Ethernet Subnets* for pre-requisite information on understanding Ethernet network I.P. addresses and Subnet concepts.  Further description in this section assumes you have a general knowledge level of I.P. addressing and subnets.

All *ConveyLinx ERSC* 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 is defined as the **Node**.

For example; if an *ERSC* has an I.P. address of "192.168.25.20" then its *Subnet* address is "192.168.25" and its *Node* is "20"

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

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

In the example below; 4 *ERSC's* are installed "out of the box" onto the conveyor.  Once the *Auto Configuration Master* is identified and the *Auto-Configuration Procedure* is performed; all 4 *ERSC's* will have their I.P. address configured as shown.
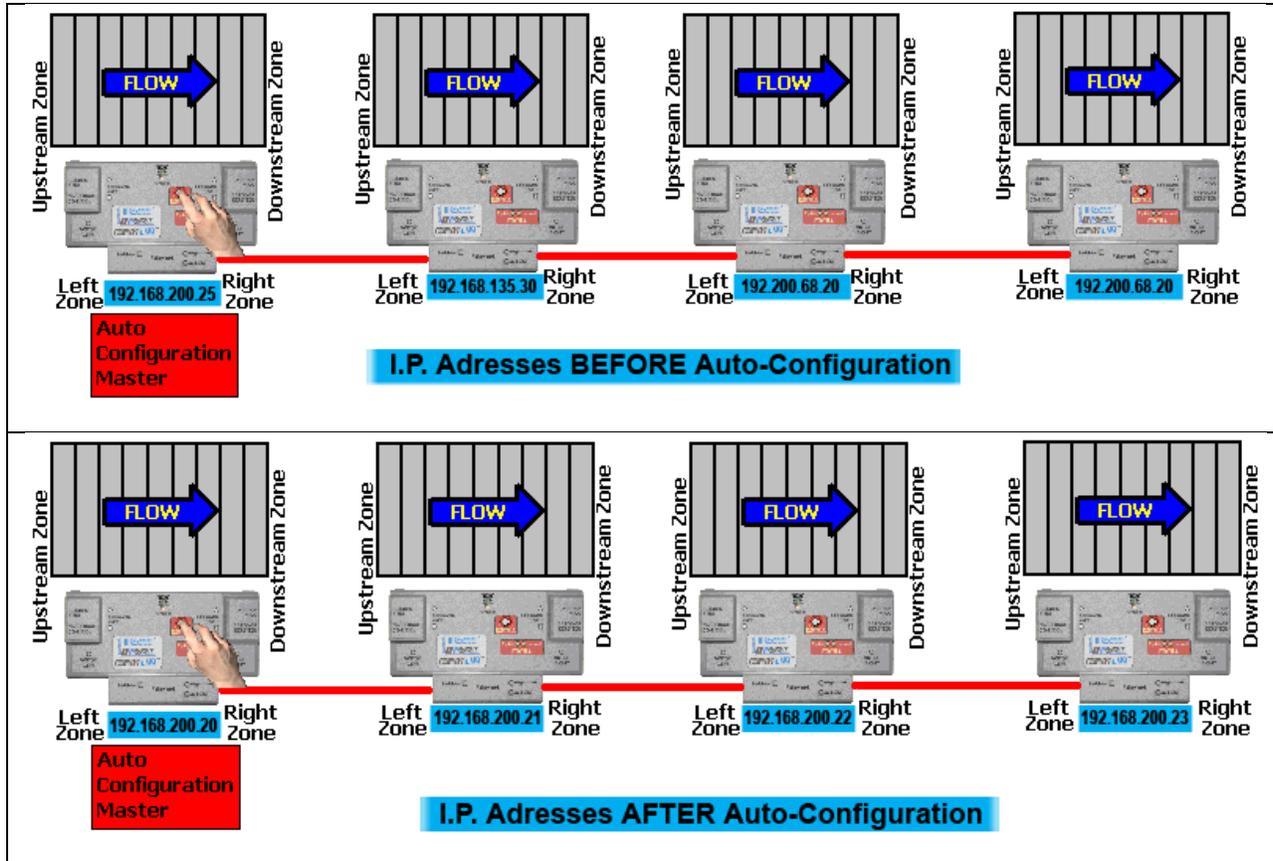
The *Auto-Configuration Procedure* will assign *Nodes* up to and including *Node 240*. Therefore each *Subnet* is limited to 220 *ERSC Nodes.*

## CONNECTING YOUR PC TO CONVEYLINX NETWORK

Using a crossover Ethernet cable to connect to Revision 1 Hardware ERSC's or a straight through cable for Revision 2 Hardware ERSC's; connect your PC's Ethernet port to the *Auto-Configuration Master* as shown below in Figure 41
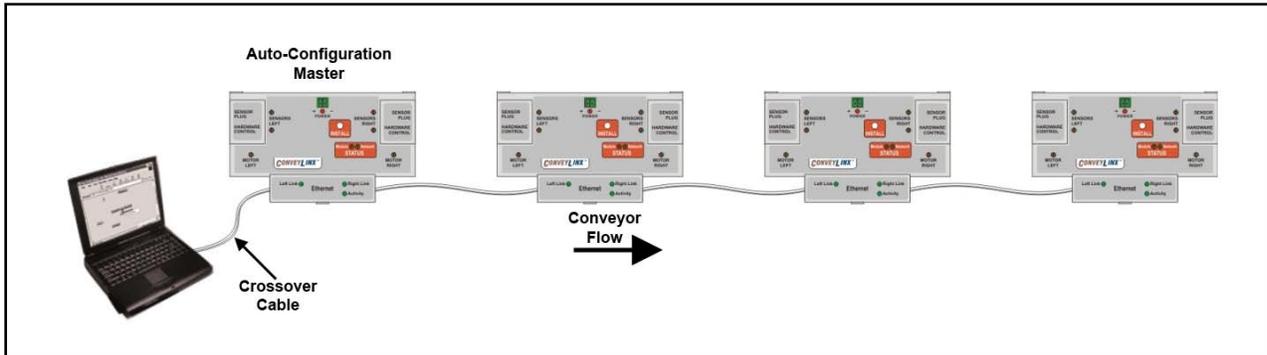


**FIGURE 41 - INITIAL PC CONNECTION TO CONVEYLINX SUBNET**

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

## OPTIONS FOR CONFIGURING YOUR PC'S IP ADDRESS

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

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

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

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

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

If using the ConveyLinx *DHCP* service to assign your PC's I.P. address; you do not need to even start *EasyRoll* to accomplish this.  By following the procedures described in section *Change PC's IP Address Procedure* from *Appendix B–Configuring PC for Ethernet Subnets* on page 117 you will see your PC's TCP/IP Properties.

| | |
|---|---|
| If your PC is already configured to obtain an IP address automatically; then by simply connecting you PC as shown in *Figure 41 - Initial PC Connection to ConveyLinx Subnet* is all you have to do to have the PC's I.P. address configured so you can use *EasyRoll* |  |
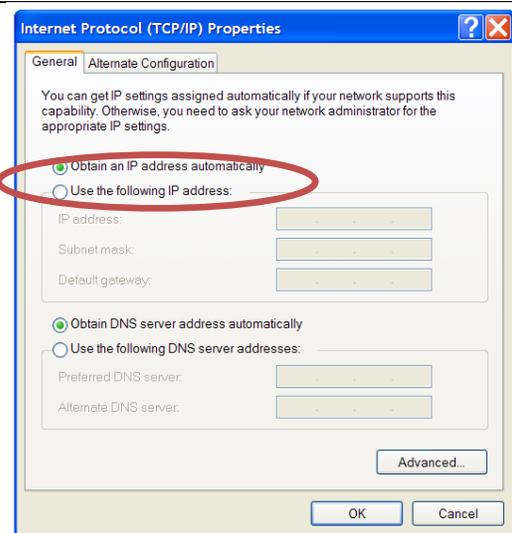
## MANUAL I.P. ADDRESS CONFIGURATION METHODS

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

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

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

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

## USING EASYROLL TO LOCATE AUTO-CONFIGURATION MASTER

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

### STARTING EASYROLL APPLICATION

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

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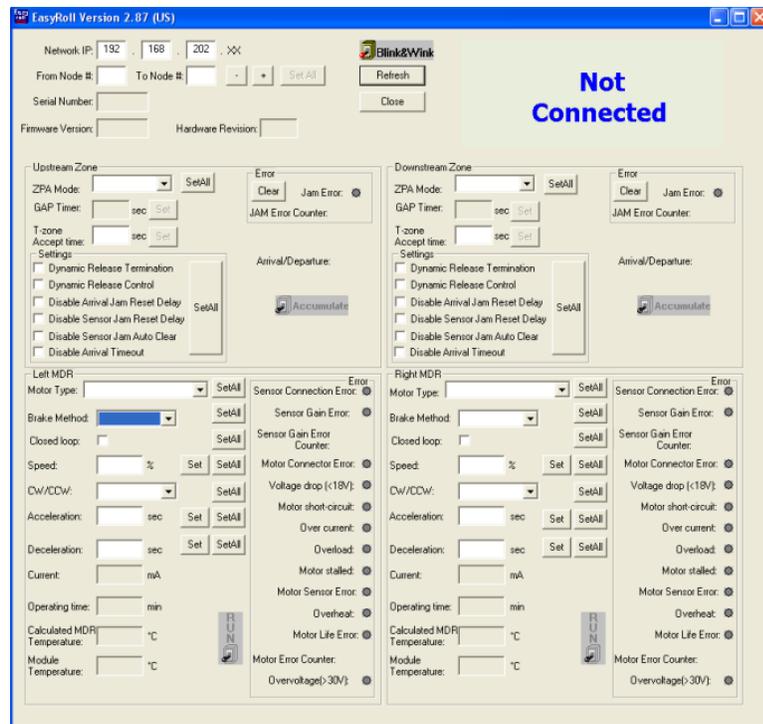


Regardless of whether you need to change your PC's I.P. address to match your already configured *ConveyLinx Subnet* or change the *ConveyLinx Subnet's Auto-Configuration Master* to match a subnet address you want to use; you have to connect to the *Auto-Configuration Master*.

### USING THE UDP DISCOVER UTILITY

One of the features of *EasyRoll* is that it has a utility called *UDP Discover* that allows your PC to go and find any *ERSC* 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 *ERSC* modules.

To access the UDP Discover Utility; you need to invoke the *ConveyLinx Advanced Dialog* window.  To do this, press **F2.**

When you press **F2**,*EasyRoll* will try to first communicate with the default Network IP shown on the screen, then because the *Node No.* fields are blank; you will see an error message similar to that shown here.  This is normal and you can simply click OK.

After clicking OK on the error message above, *EasyRoll* will display the *ConveyLinx Advanced Dialog* screen.  Click on the tab *Network Services.*
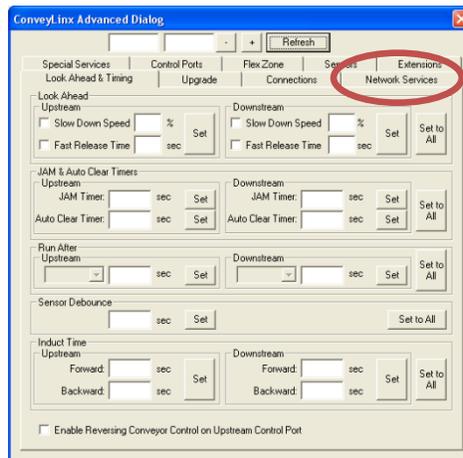
After clicking the *Network Services* tab, you will see the screen you will use to both "discover" the *ERSC's* that can be found as well as select a specific *ERSC* in which to modify its I.P. address settings.

On this screen, click the "Discover" button
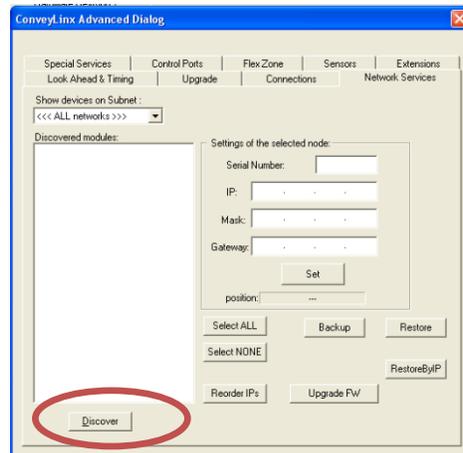
After clicking the "Discover" button, *EasyRoll* will query the network and return a list of all *ERSC* modules it finds and shows each module's I.P. address, serial number and current Firmware. We already know that the *Auto-Configuration Master* is the *ERSC* with the *Node* of 20.

In this example, 25*ERSC's*were found and the *Auto-Configuration Master* is at 192.168.26.20, its serial number is 71544 and has Firmware x.xx
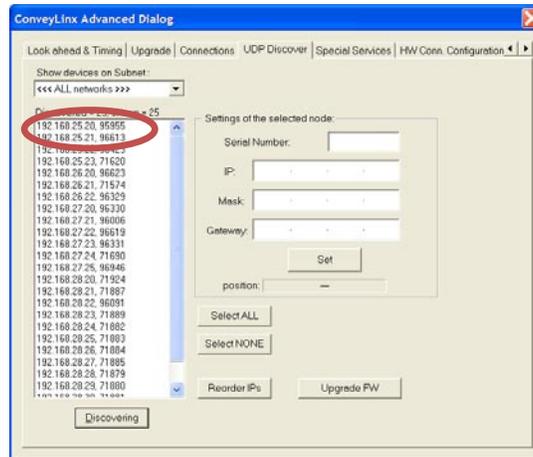
Please refer to section

*ConveyLinx Advanced* Dialog for further descriptions for the remaining *ConveyLinx Advanced Dialog* screen selection tabs.

METHOD 2 - CHANGE PC TO MATCH AUTO-CONFIG MASTER

At this point, because you now know the *Auto-Configuration Master's* I.P. address you can simply change your PC's IP address configuration so that is can have access to the *Auto-Configuration Master's Subnet*. In the example above, the *Auto-Configuration Master's* I.P. address is 192.168.26.20 therefore the *ConveyLinx Subnet* is 192.168.26. Please refer to *Appendix B–Configuring PC for Ethernet Subnets* for details on how to set your PC's IP address and subnet mask to access the *ConveyLinx Subnet* you discovered.

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

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

Single click the *Auto-Configuration Master* in the list.  When you do this, its I.P. address information is filled in as shown.  Simply enter in the new I.P. address information you want to use and then click the "Set" button.
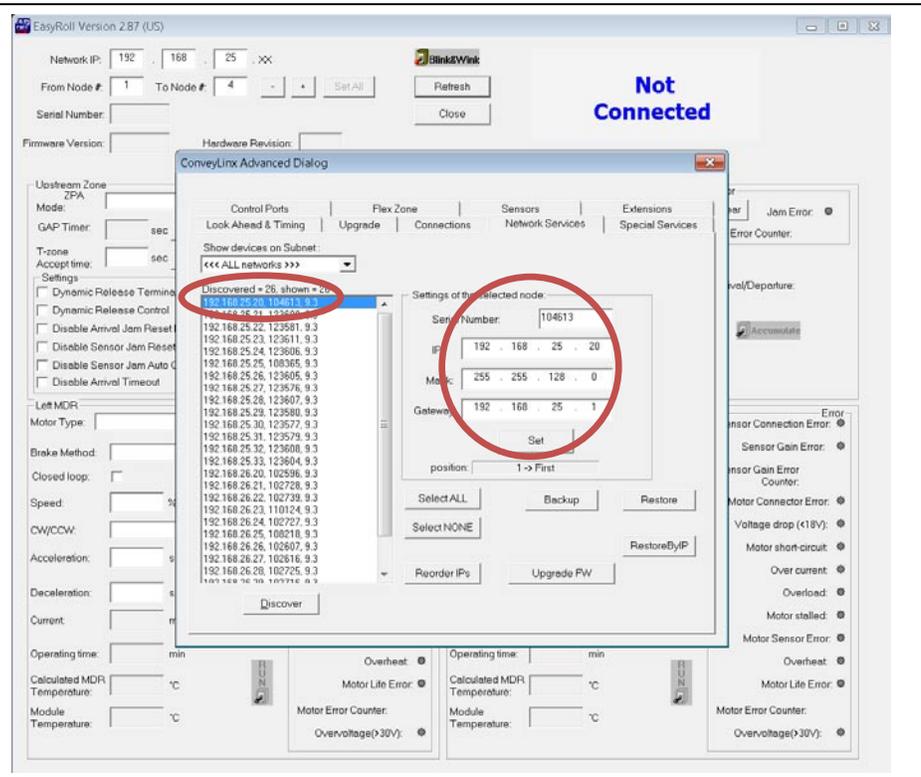
After clicking the "Set" button, you can click the "Discovering" button again and *EasyRoll* will refresh the list of modules at the left.  You can verify that the module has the new I.P. address settings.

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

## EASYROLL MAIN SCREEN

Assuming you have either changed your PC's configuration or changed the *Auto Configuration Master's* configuration as described above; you should now be able to use the *EasyRoll* main screen to view your system's status and change operational parameters.  If you have followed the above example, simply closing the *ConveyLinx* Advanced Dialog will show the main screen.  The main screen is also shown when you first run *EasyRoll*.  *Figure 42 - EasyRoll Main Screen* shows a typical main screen.
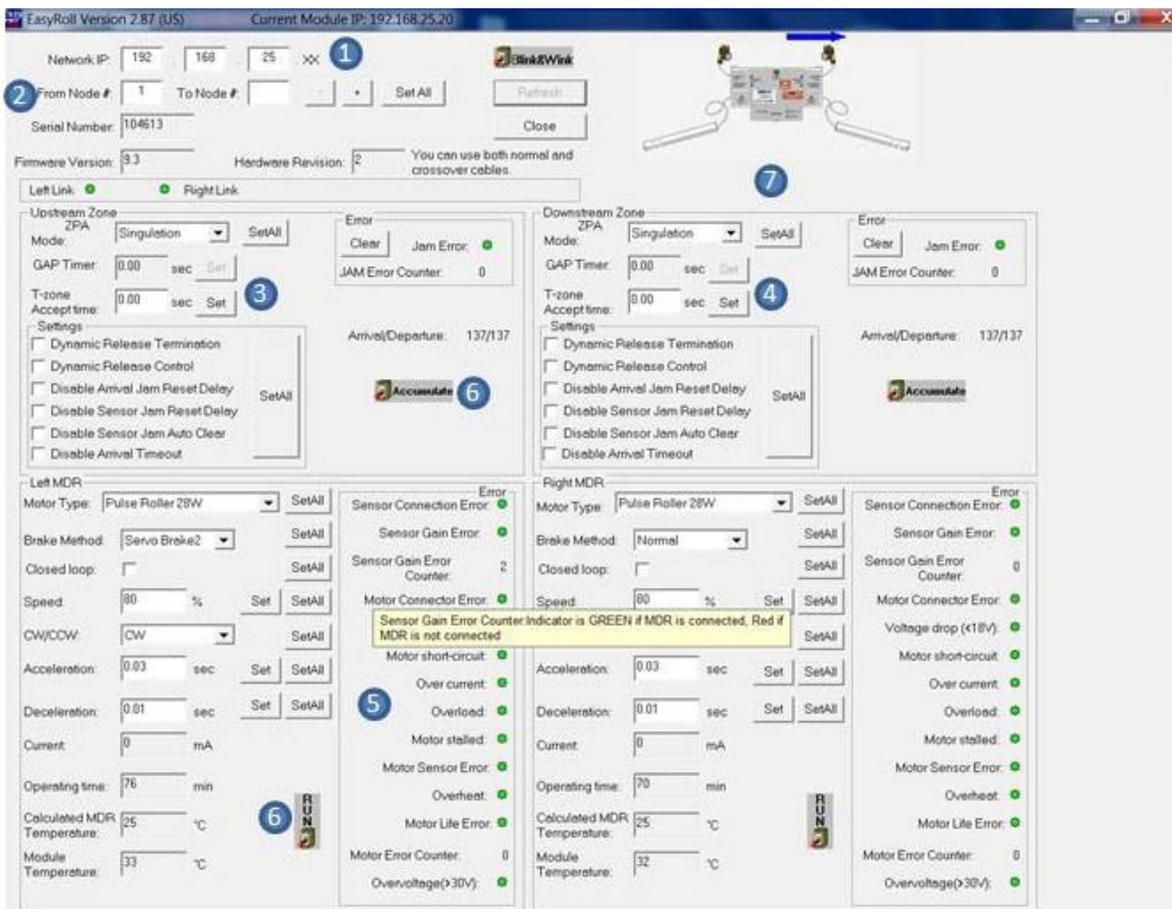


**FIGURE 42 - EASYROLL MAIN SCREEN**

The numbered items in *Figure 42 - EasyRoll Main Screen* show the basic functional areas and detailed descriptions will follow for each.

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 diagnostic controls to jog the zone ("Forced Run") and command the zone to Accumulate if a load arrives.

4. Left Zone / Right Zone Settings – These are the selections for changing MDR type, braking method, closed loop regulation, speed, direction, and accel/decel time values.  There are also "Set" and "Set All" buttons used to write values to module(s).

5. Left / Right Status – Various indicators and values of the current *ERSC's* status are shown.

6. Force Jog and Force Accumulate – These are on/off toggle controls used to jog the local zone's motor and to set the local zone to accumulation mode.

7. Configuration Indicator – This area will display a graphic image of the current module's detected configuration.

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

## CONNECTING TO CONVEYLINX

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

### NODE NAVIGATION

| | |
|---|---|
| Whatever *Node* is entered in the first box will be the particular *ERSC* data shown in the remainder of the main screen. | From Node #: 1   To Node #: 12   -   +   Set All |
| The *Node* value entered in the second box does not have to be the actual "last" node of the network.  If you enter a *Node* value higher that exists; an error message will display after you click the "Refresh" button.  For the example shown; if there were only 10 *Nodes* installed and you entered 12, you would receive 2 error messages in succession after clicking the "Refresh" button. | From Node #: 1   To Node #: 12   -   +   Set All |

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

## NODE IDENTIFICATION

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

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

## UPSTREAM / DOWNSTREAM ZONE CONFIGURATION

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

| Selecting the pull down box for "ZPA Mode" will show the available selections.   *Singulation* is the default configuration.  Please refer to section  ZPA Mode Selections for descriptions for *Train* and *GAP Train* modes. |  |
| --- | --- |
| Clicking the "Forced Run" switch will cause the zone's MDR to jog in its default rotation direction.  Clicking the "Accumulate" switch will place the zone in accumulation mode and the next load that arrives at that zone will stop and remain until you click the switch again to turn off the accumulation mode. |  |
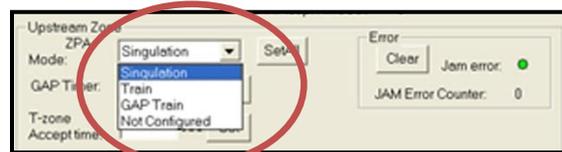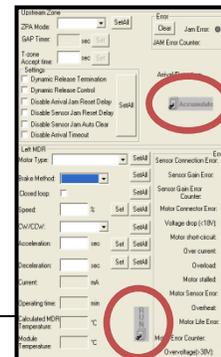
<table>
<tr>
<td>Selecting a new setting from the "ZPA Mode" drop down box immediately changes the zone's mode. If you want to set all Upstream zones for the range of nodes entered in the "Node No." text boxes, then click the "Set All" buttons.

Similarly, you can do the same operation in the "Downstream Zone" portion of the main screen.</td>
<td></td>
</tr>
</table>
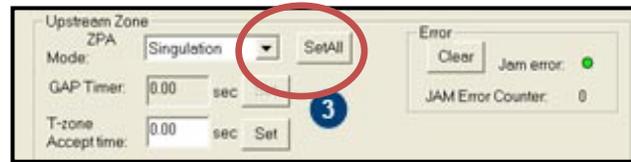
ZPA MODE SELECTIONS

*Singulation* mode is the default configuration for all zones upon the completion of the *Auto Configuration Procedure*. Please refer to section

Default Singulation Release ZPA Mode on page 39 for description.  The following sections describe the ZPA modes available via *EasyRoll*.

## TRAIN RELEASE MODE

For zones configured for *Train Release Mode*; when the downstream train zone releases, all subsequent upstream zones begin to run simultaneously.  This makes the MDR conveyor operate similar to a conventional single drive roller conveyor in that all loads move at once.  Figure 43 illustrates a typical Train Release example.
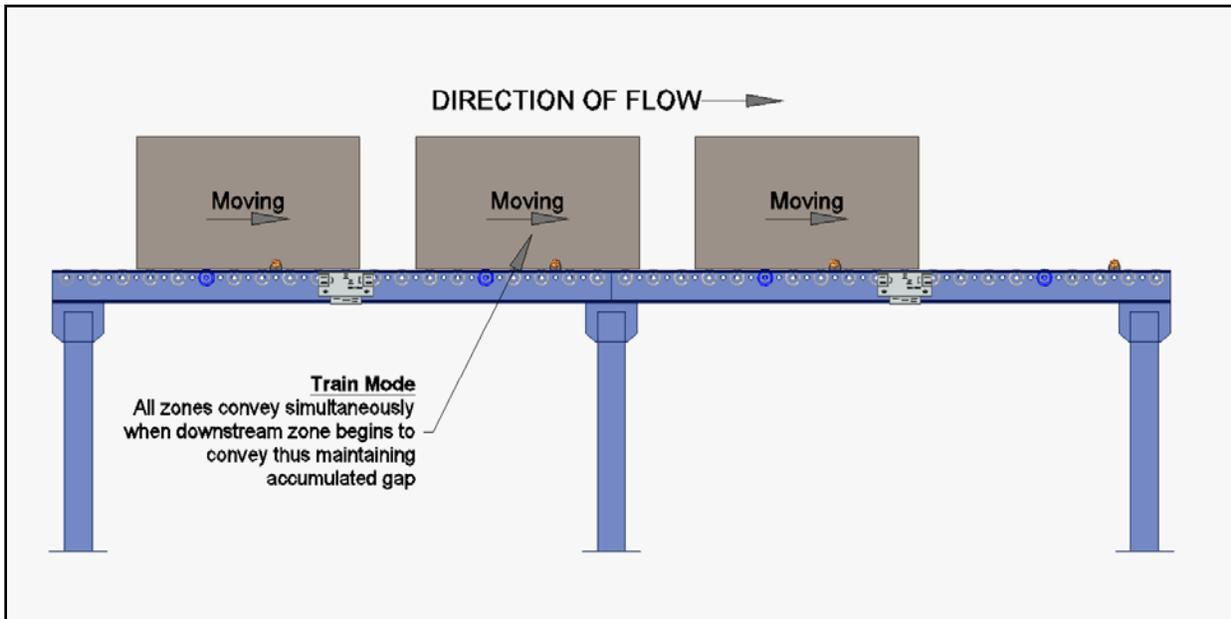


**FIGURE 43 - TRAIN RELEASE EXAMPLE**

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

## GAP TRAIN RELEASE MODE

*Gap Train* is a variant to *Train* release in that it incorporates a fixed time delay prior to allowing the loads to move.  The typical usage of *Gap Train* would be to apply this configuration to the discharge zone of a group of zones already placed in *Train* mode.  This configuration could be used to assure a specific minimum gap between cartons.

For example, let's say the Gap Timer is set to 5 seconds on the discharge zone and we have 10 zones behind this discharge zone all set to *Train Mode* and all zones are occupied and accumulated.  We then release the carton in the discharge zone.  All cartons in all 10 zones move simultaneously because they are in *Train* mode.  Once the lead carton in the discharge zone has cleared its photo-sensor; the *Gap Timer* starts.  The next carton arriving at the discharge zone will stop at the discharge zone and remain stopped until the *Gap Timer* expires.  When the *Gap Timer* expires; the discharge zone will release and the train of cartons in all 10 upstream zones will again move simultaneously forward.

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


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

### T-BONE CONFIGURATION

In conveyor applications, transferring a load 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 load 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-Bone* arrangement. *ConveyLinx* contains the logic to control a *T-Bone* arrangement without requiring any external control interface or programming. Figure 44 shows the kind of *T-Bone* arrangement that is available within *ConveyLinx* without any external control interface.
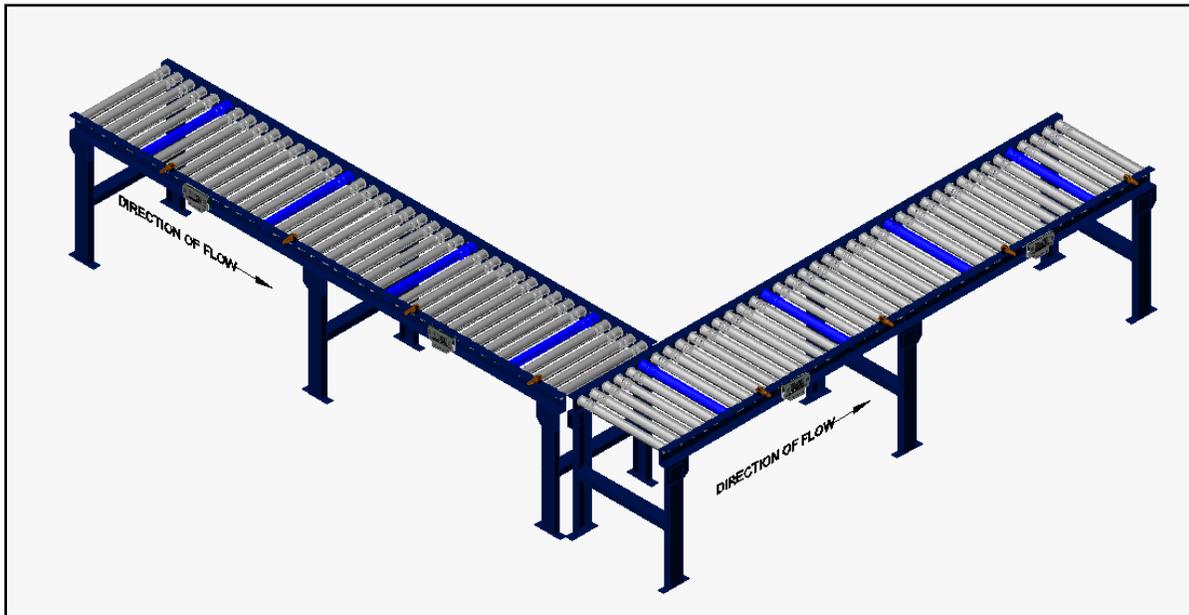


**FIGURE 44 - TYPICAL T-ZONE CONFIGURATION**


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

### CONNECTING ERSC FOR T-BONE ARRANGEMENT

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

1.  Sending and Accepting zones can be on the same *ERSC*

2.  Sending and Accepting zones can be on two different *ERSC's.*

Figure 45 and Figure 46 depict two ways to connect the MDR's and photo-sensors to *ERSC* modules to result in a valid T-Bone configuration.
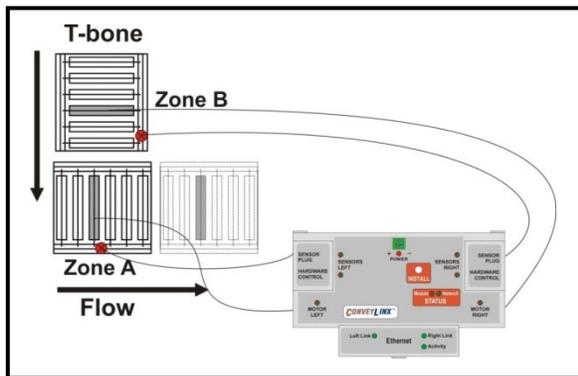


FIGURE 45 - SINGLE ERSC T-BONE EXAMPLE
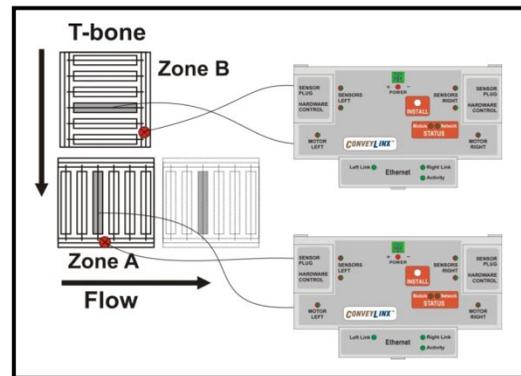


FIGURE 46 - TWO ERSC T-BONE EXAMPLE

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

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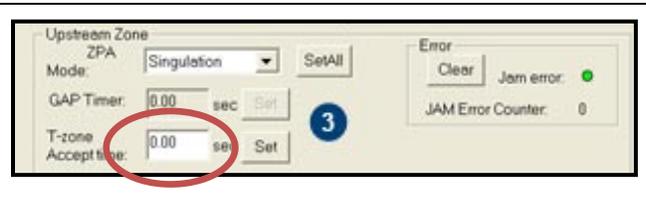
IGNORE JAM SETTINGS

Any individual zone or group of zones can be configured to ignore the auto reset time delay for either or both of the detected jam conditions.  These jam conditions are described in section *Jam* Condition on page 40.  Selecting either of these options will not eliminate the detection of the particular jam condition; it simply eliminates the default time delay the logic utilizes before automatically clearing the condition.  For example, assume the Jam Timer setting is 5 seconds.  If a particular zone sensor remains blocked while its zone is running for 5 seconds, the zone will stop and there will be a sensor jam condition.  Under default configuration, the sensor must be cleared for 5 seconds (same value as Jam Timer setting) before the zone will return to automatic function.  If the checkbox

for "Ignore Sensor Jam" is selected, this delay of 5 seconds after the sensor is clear is not used and the zone will return to normal automatic operation immediately after the sensor is cleared.

Similarly for the Arrival Jam, if a load is in transit from upstream to downstream, the logic expects the load to arrive downstream within the time dictated by the Jam Timer setting.  If it does not arrive within this time window, there is an Arrival Jam.  After the Arrival Jam is detected, by default, it will automatically clear after the Jam Timer value of time has expired again.  By selecting the checkbox for "Ignore Arrival Jam", the logic will not wait for the additional delay time and the Arrival Jam will automatically reset immediately after being detected.

| | |
|---|---|
| Clicking either or both checkboxes will cause the zone's logic to ignore the reset delay for the particular jam condition. |  |

## MDR SETTINGS

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

### MOTOR TYPE

| | |
|---|---|
| The "Motor Type" pull-down box lists all motor brand and types whose profiles are available for ERSC.  Pulse Roller 28W is the default setting upon completion of the Auto-Configuration Procedure.  The new settings are downloaded to the selected Node upon selecting a new item from the list.  Clicking "Set All" will download the selected setting to the Left Zones of all ERSC's entered in the range of Nodes at the top of the main screen in the "Node No:" boxes. If for example the "Node No." boxes had the values of 5 and 12; changing the selection in the "Motor Type" pull down will change Node 5 and clicking "Set All" will change Nodes 6 thru 12 to the same setting as Node 5. |  |

⚠️    Please consult your particular MDR's documentation and review your application if you are unsure as to which motor-type setting to use.

⚠ Selecting *Pulse Roller 35W* will enable the mechanical brake control signal on Pin 9 of the MDR connector.  Refer to section *Motor Left and Motor Right Ports*on page 19 for connection details.  Connecting a non-Pulse brand roller with the Pulse Roller 35W motor-type setting can potentially damage the MDR.

BRAKE METHOD

| The "Brake Method" pull-down box lists all the MDR braking methods available for *ERSC*. Brake is the default setting upon completion of the *Auto-Configuration Procedure*. The new settings are downloaded to the selected *Node* upon selecting a new item from the list. Clicking "Set All" will download the selected setting to the Left Zones of all *ERSC's* entered in the range of *Nodes* at the top of the main screen in the "Node No:" boxes. If for example the "Node No." boxes had the values of 5 and 12; changing the selection in the "Brake Method" pull down will change *Node* 5 and clicking "Set All" will change *Nodes* 6 thru 12 to the same setting as *Node* 5. |
|---|
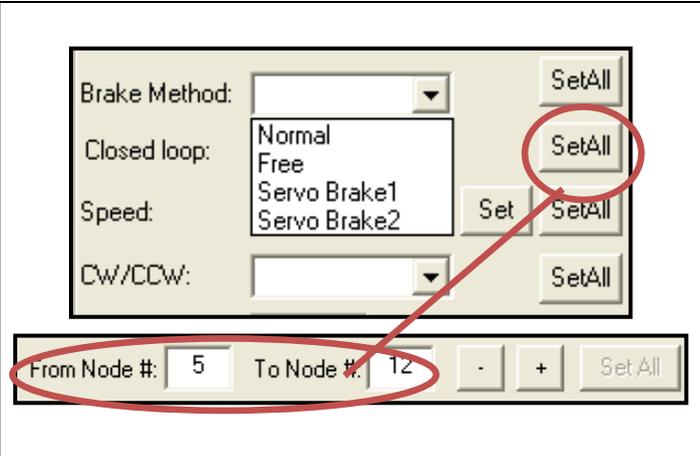
The following table defines the MDR Braking Methods available:

| Method | Description |
|---|---|
| **Normal** | Standard Dynamic braking - MDR power circuit in *ERSC* is internally connected during motor stop sequence to provide backward energy to bring rotor to a stop. When *ERSC* has detected that the motor has stopped; all winding current is shut off from the MDR. This is the MDR industry standard braking method and is the default factory setting for all *ERSC* zones from the *Auto-Configuration Procedure* |
| **Free** | MDR power circuit in *ERSC* is internally disconnected to allow rotor to "free spin" until its mechanical load brings it to a stop. |
| **Servo Brake 1** | When a zone is commanded to stop; the *ERSC* utilizes the MDR's Hall Effect sensors to determine the position of the rotor and will inject current into the motor windings to maintain rotor position. *Servo Brake 1* utilizes 2 of its power transistors for current injection. |
| **Servo Brake 2** | When a zone is commanded to stop; the *ERSC* utilizes the MDR's Hall Effect sensors to determine the position of the rotor and will inject current into the motor windings to maintain rotor position. *Servo Brake 2* utilizes 3 of its power transistors for current injection. |

Servo Brake 1 and 2 are functionally equivalent. Servo Brake 2 utilizes more power and provides more holding torque. Consequently, because Servo 2 uses more current, the potential for heat build-up is present depending on your application. If Servo Brake 1 provides enough holding torque for the application, it is recommended using it in lieu of Servo Brake 2. Servo Brake 2 should only be used when Servo Brake 1 does not provide enough holding torque for the application.

## SPEED

The *Speed* setting value is in % of the selected *Motor Type*'s rated **P**ulse **W**idth **M**odulation (PWM) current. The MDR's speed is directly proportional to the PWM current being fed to it. The default setting is 80% which means that the *ERSC* power circuit delivers 80% of the rated PWM current for whichever *Motor Type* is selected. This rated PWM current value is part of the motor profile data associated with the *Motor Type* selected and is determined for each MDR brand and model listed.

⚠️ Please consult your particular motor brand and model's documentation for determining the actual speed of the MDR's for your application. The actual mechanical speed of the MDR is determined by the mechanical gearing attached to the motor. MDR's with identical motors may run at very different speeds and have very different torque characteristics depending on the mechanical gearing used.

## CLOSED LOOP

*Closed Loop* speed control utilizes a proportional – integral (PI) algorithm to regulate MDR speed. When enabled, the *ERSC* motor control processor accepts the input from the MDR's Hall Effect sensors to measure rotor speed and will adjust motor current accordingly to more precisely regulate speed. The default setting is for *Closed Loop* to be disabled.

*Closed Loop* speed regulation can be used for applications where you need maintaining constant speed with varying load weights. Without *Closed Loop* enabled (default) the *ERSC* will provide the %PWM current specified by the *Speed* setting and actual MDR speed can fluctuate depending on mechanical loading of the MDR.

| | |
|---|---|
| The "Set All" buttons for both the *Speed* and *Closed Loop* settings will apply these settings to all *Nodes* in the range of *Nodes* selected at the top of the main screen similarly to the *Motor Type* and *Brake Method* "Set All" buttons |  |
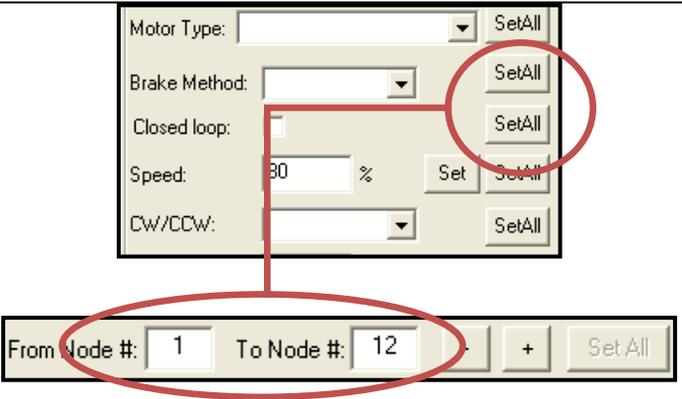
⚠️ Closed Loop speed control will provide PWM current to the MDR up to the limit of the particular MDR's selected profile and or the current limits allowed by the module's built in protection algorithms and circuitry. Please consult your particular motor brand and model's documentation and review your particular mechanical application prior to implementing Closed Loop speed control.

**\*\*WARNING\*\*** Due to lower inductance of higher speed Senergy Motors, the chances of Short Circuit Errors increase when using very low deceleration values.

SHORT CIRCUIT ERRORS may occur when using speeds over 75% along with deceleration values less than 0.1 second with Servo Braking (1 or 2) and Closed Loop disabled. This error may also occur when Closed Loop is enabled and using Servo 2 braking while in Senergy Eco Mode. There are 3 ways to reset a Short Circuit Error:

1. Go to the Special Services Tab in the *EasyRoll* Utility and click Reset.
2. Cycle power to the ERSC.
3. Use programming Software such as ConveyLogix or RSLogix500.

MOTOR DIRECTION

This setting is either **C**lock-**W**ise (CW) or **C**ounter-**C**lock **W**ise and is determined for each *ERSC* based upon the *Auto-Configuration Procedure* results. Please refer to section

Motor Direction Definition on page 28 for definition of rotation direction.

This setting is available because some MDR brands and models do not rotate the MDR tube in the same direction in relation to the motor rotor for all the particular model's speed codes.

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

### ACCELERATION / DECELERATION

The acceleration and deceleration control for a given MDR is configurable in value of time duration.  The default acceleration value is 0.050 seconds (50 milliseconds) and the default deceleration time is 0 seconds.

The limit for acceleration values is 0.05 to 10 seconds.  The limit for deceleration values is 0 to 10 seconds.

## CONVEYLINX ADVANCED DIALOG

We introduced the *ConveyLinx Advanced Dialog* briefly in section *Using the UDP Discover Utility* on page 76.  This section will define the remaining tab selections from this screen.

### INVOKING THE CONVEYLINX ADVANCED DIALOG

To invoke the *ConveyLinx Advanced Dialog*, simply press the F2 key or simultaneously press [Shift][Ctrl]U:

| | |
|---|---|
| Whatever *Node* is entered in the first box when you press **[SHIFT][CTRL] U or F2** will be the particular *ERSCNode* data in context for the *ConveyLinx Advanced Dialog* tab selections when the dialog screen pops up. | From Node #: 1   To Node #: 12   -   +   Set All |

### LOOK AHEAD & TIMING

The default screen tab of the *ConveyLinx Advanced Dialog* is the *Look Ahead & Timing* settings.

#### LOOK AHEAD FEATURE

The *Look Ahead* feature configures the *ERSC* logic to "look ahead" to its next downstream zone and if it is occupied when a load is entering its zone, the*ERSC* will dynamically adjust the MDR to the selected speed.  This feature would be used in higher speed applications were increased stopping distance is required to keep loads from over-travelling their stop positions.  This function can be applied per zone or system-wide.
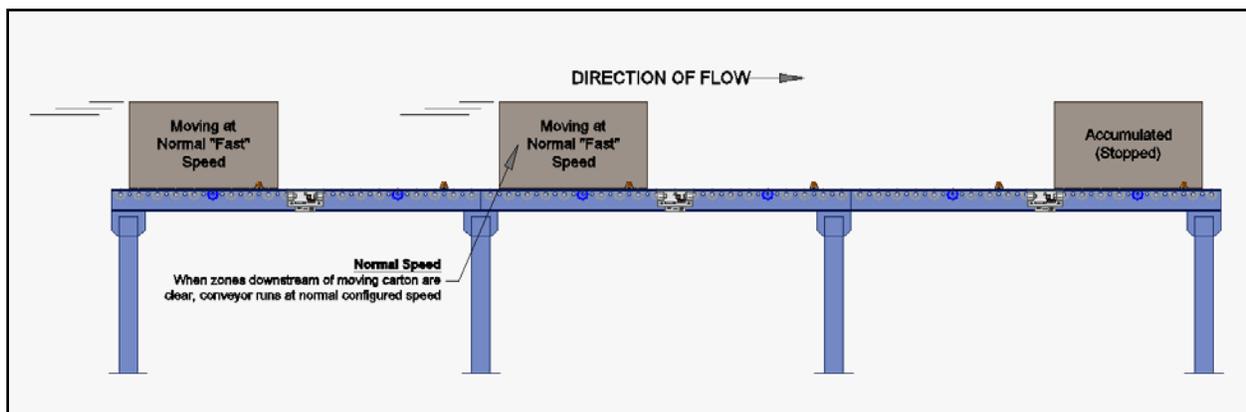


**FIGURE 47 - NORMAL RUNNING BEFORE LOOK AHEAD ENABLES**

In Figure 47, conveyor runs at the speed configured for the *ERSC* per the *Auto-Configuration Procedure* or the value entered if it was manually changed.
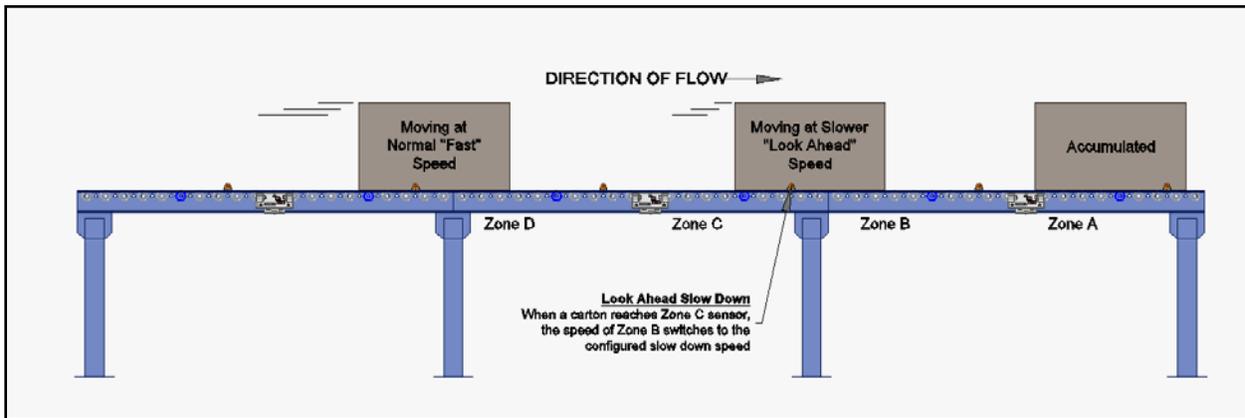
FIGURE 48 - LOOK AHEAD ENABLED

As shown in Figure 48, when a carton arrives at Zone C's photo-sensor, Zone B's *ERSC* will automatically adjust the speed of Zone B to the configured *Look Ahead* speed.

Click the checkbox to enable the *Look Ahead* feature for the selected *Node*. Clicking the "Set" buttons will download the setting to the respective zone on the selected *Node*. The value entered for the slowdown speed is in percent of the *Node's* normal speed as set on the main screen. In this example, the slowdown speed will be proportional to 50% of 100% PWM current. If the PWM speed on the main screen was set to 80% PWM, then the slowdown speed would be "50% of 80% PWM". *(Refer to the Easyroll Tool Pop-Up Dialogue for more detail information regarding Slow Down and Fast Release Time.)*
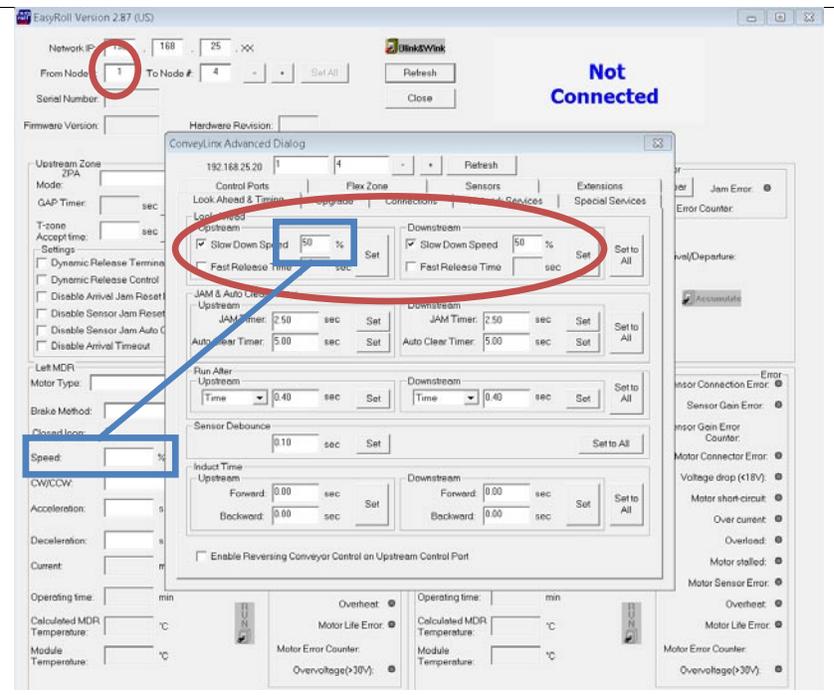
Clicking "Set All" will enable the *Look Ahead* feature at the % speed entered for all *Nodes* in the range of *Nodes* on the main screen. *(Refer to the Easyroll Tool Pop-Up Dialogue for detailed information regarding Slow Down and Fast Release Time feature.)*
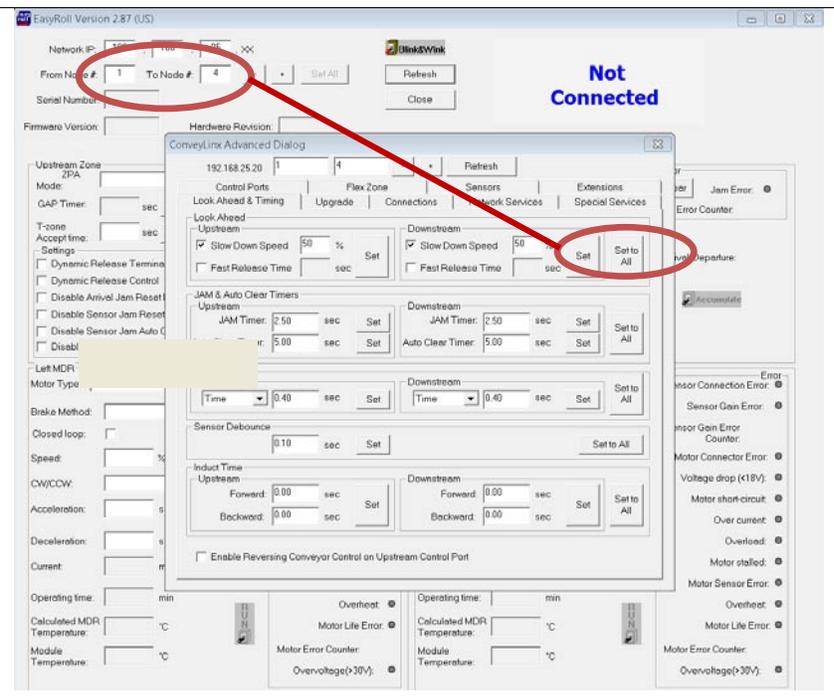
## JAM, AUTO CLEAR,& RUN AFTER TIMERS

The *Jam* timers are used by the logic as the expected time it takes for a load to travel from one zone to the next.  If this timer expires before the load reaches the next zone, the *ERSC* will indicate a Jam condition. Jam condition at any zone will automatically clear once its photo-sensor has been clear for the *Jam* timer value.

If a zone is in a Jam condition and its photo-sensor remains blocked; the photo-sensor must be cleared and remain clear for the *Jam* time value.  When a given zone is in a jammed condition, the logic inhibits any upstream loads from entering that zone.

The default value for the *Jam* timer is 5 seconds and the valid range of values for any given *Jam* timer can be found is from 1 seconds to 20 seconds.

The *Auto Clear Timer* is the amount of times that ConveyLinx waits before trying to clear a jam.  After a Jam does occur, it's now possible to set a time to wait before attempting to clear the current jam and trying again.

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

The default value for the *Run After* timer is 0.4 seconds, the ranges for the *Auto Clear Timer* is from 0 to 10, and the valid range of values for any given *Run After* timer is from 0.1 seconds to 6 seconds.

| | |
|---|---|
| Clicking any of the "Set" buttons for either *Jam* or *Run After* timers will download the entered setting to the respective zone on the selected Node.*(Refer to the EasyRoll Tool Pop-Up Dialogue for detailed information regarding the Jam and Auto Clear Timer settings and functions)* |  |
| Clicking "Set All" for either the *Jam* or *Run After* timers will set the entered values for all *Nodes* in the range of *Nodes* on the main screen. *(Refer to the EasyRoll Tool Pop-Up Dialogue for detailed information regarding the Jam and Auto Clear Timer settings and functions)* |  |
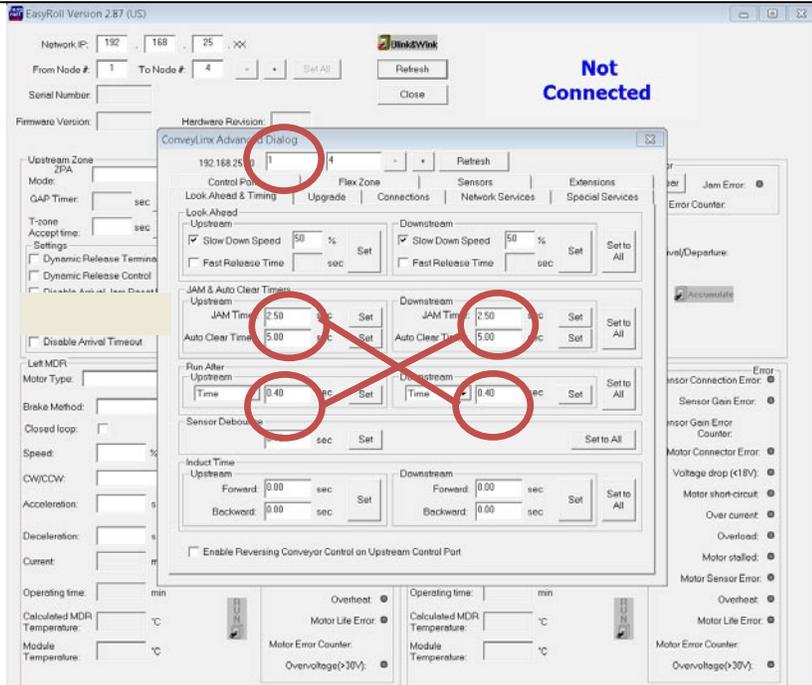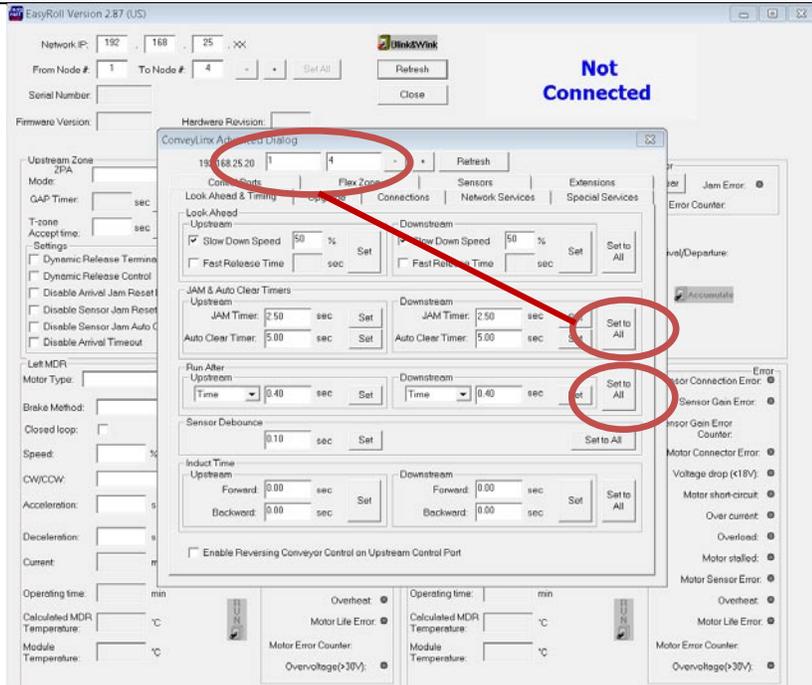
UPGRADE

The *Upgrade* tab screen gives access to the *ERSC* 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 *ERSC* modules.

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

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

| | |
|---|---|
| With the "Open" dialog displayed, navigate to the location on your PC where you placed the firmware upgrade file you received.  Select the file and click "Open". |  |
| In this example, we clicked "Upload ALL" so the selected firmware upgrade file will be sent to all 12 *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. |  |
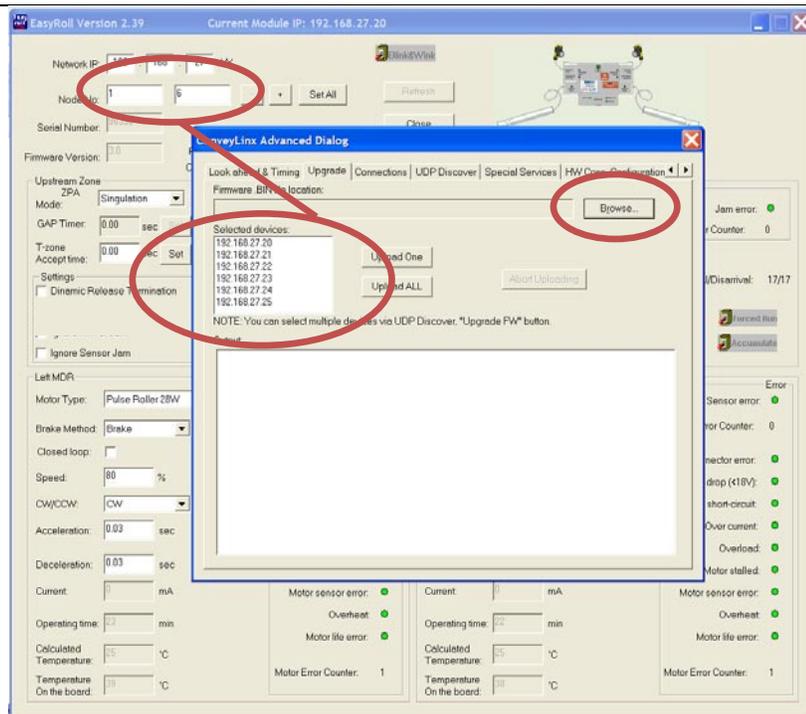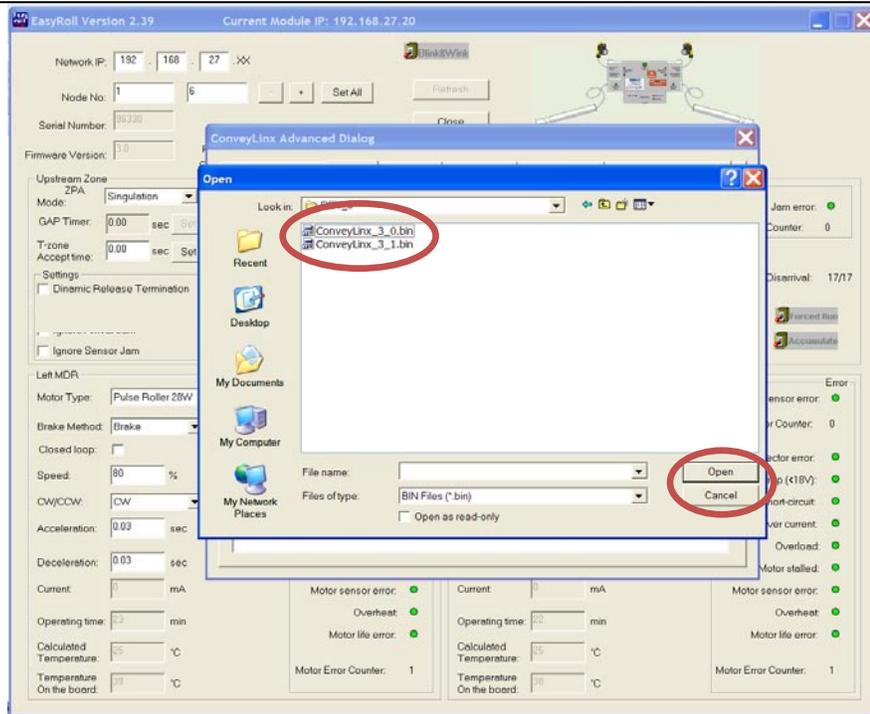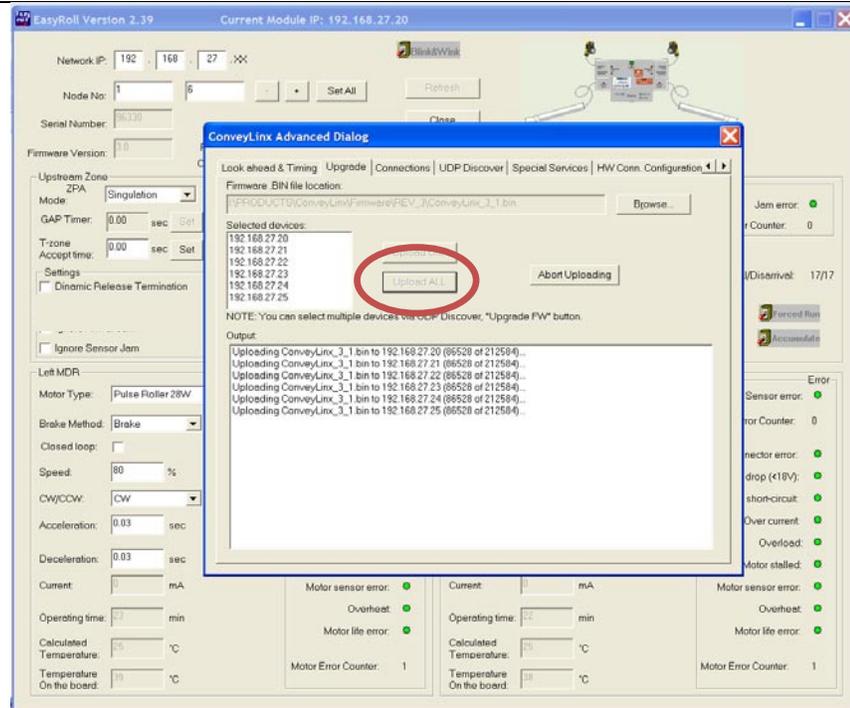
When all *Nodes* report back to the "Output" window with a status of *Done*; then the upload is complete and you can close the *ConveyLinx Advanced Dialog* window.
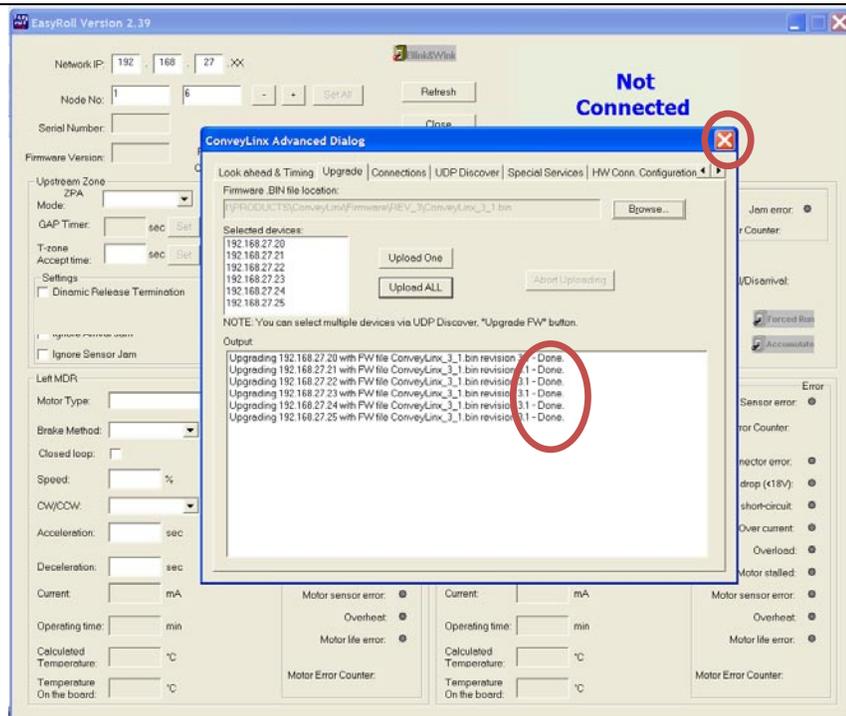
## CONNECTIONS

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

The *Connections* utility also gives you the ability to place one or both MDR zones on an *ERSC* into *Slave* mode which logically attaches the MDR run and stop functions to another *ERSC's* zone control.  A common application of *Slave* mode for an *ERSC* would be for a conveyor lift gate.

### CONNECT TWO NETWORKS TOGETHER

Figure 49 shows a typical boundary between two *Subnets*.  The most downstream *Node* of the first *Subnet* has an I.P. address of 192.168.27.25 and the most upstream *Node* of the second *Subnet* has an I.P. address of 192.168.25.20.
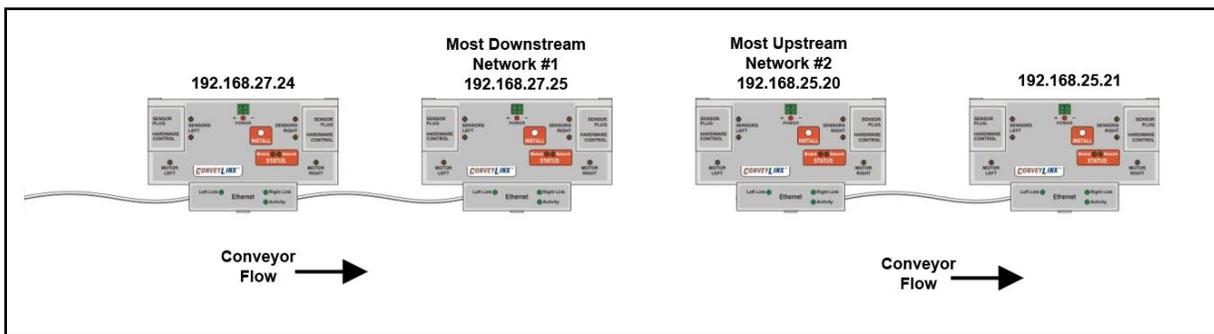


FIGURE 49 - SUBNET BOUNDARY EXAMPLE

By simply connecting a crossover Ethernet cable between these two boundary *Nodes* and then using *EasyRoll* establish the "logical" connection between the two *Subnets*; you can achieve seamless flow between the two networks.  This is shown in Figure 50.
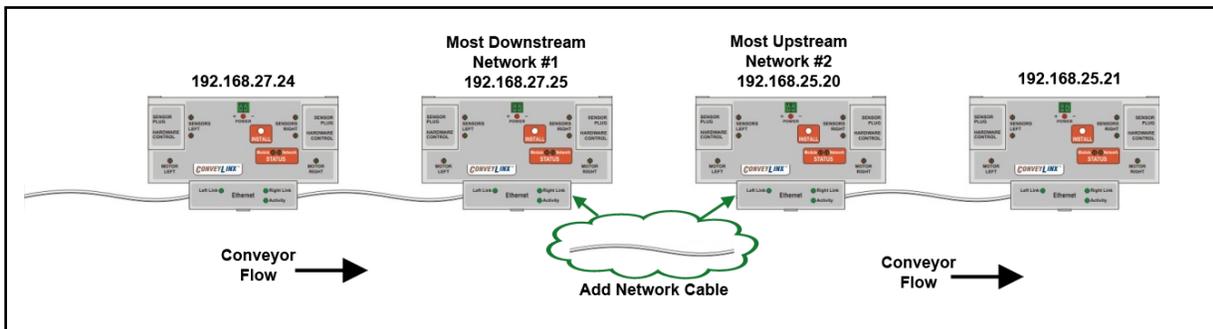


FIGURE 50 - SUBNET BOUNDARY EXAMPLE WITH CABLE

The procedure requires that you have to instruct *Node* at 192.168.27.25 to convey loads to *Node* at 192.168.25.20, and likewise you have to instruct *Node* at 192.168.25.20 to accept loads from *Node* at 192.168.27.25.

## Configuring *Node* at 192.168.27.25
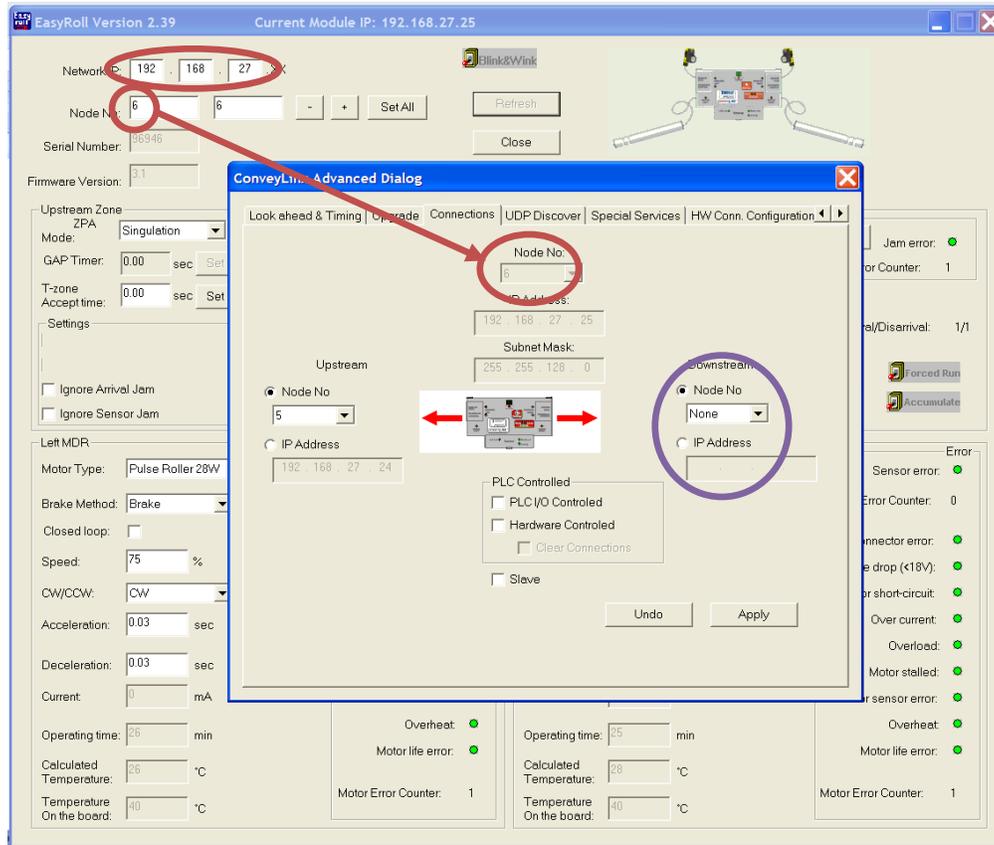


From the main screen, first enter the correct *Subnet* into the "Network IP" boxes and the correct *Node* you want to connect.  In this case we know that xxx.xxx.xxx.25 is *Node* 6 for this particular *Subnet*.

Invoke the *ConveyLinx Advanced Dialog* and select the *Connections* tab.

Note that the *Node* is being viewed is in the center and it is greyed out.  Also note that its Downstream designation indicates "None".
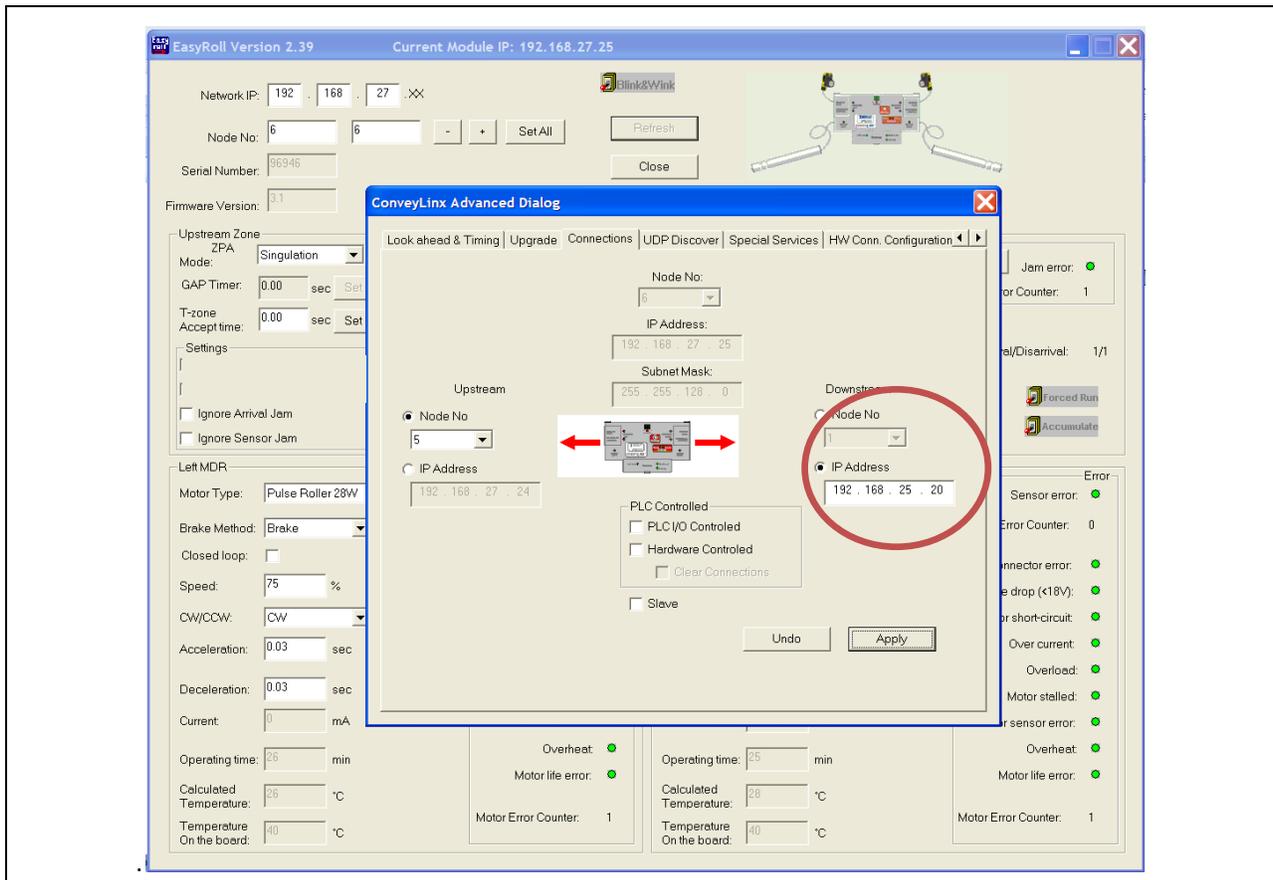
We want to change the Downstream flow to I.P. address 192.168.25.20 which is the next downstream *Node*.

Click the IP Address button and enter the correct I.P. address value and click the "Apply" button.

Please note that this will take approximately 20 seconds for the module to accept the change and restart.

At this point we are half-way complete in that we now have to instruct the downstream module to accept from upstream.

**Configuring _Node_ at 192.168.25.20**
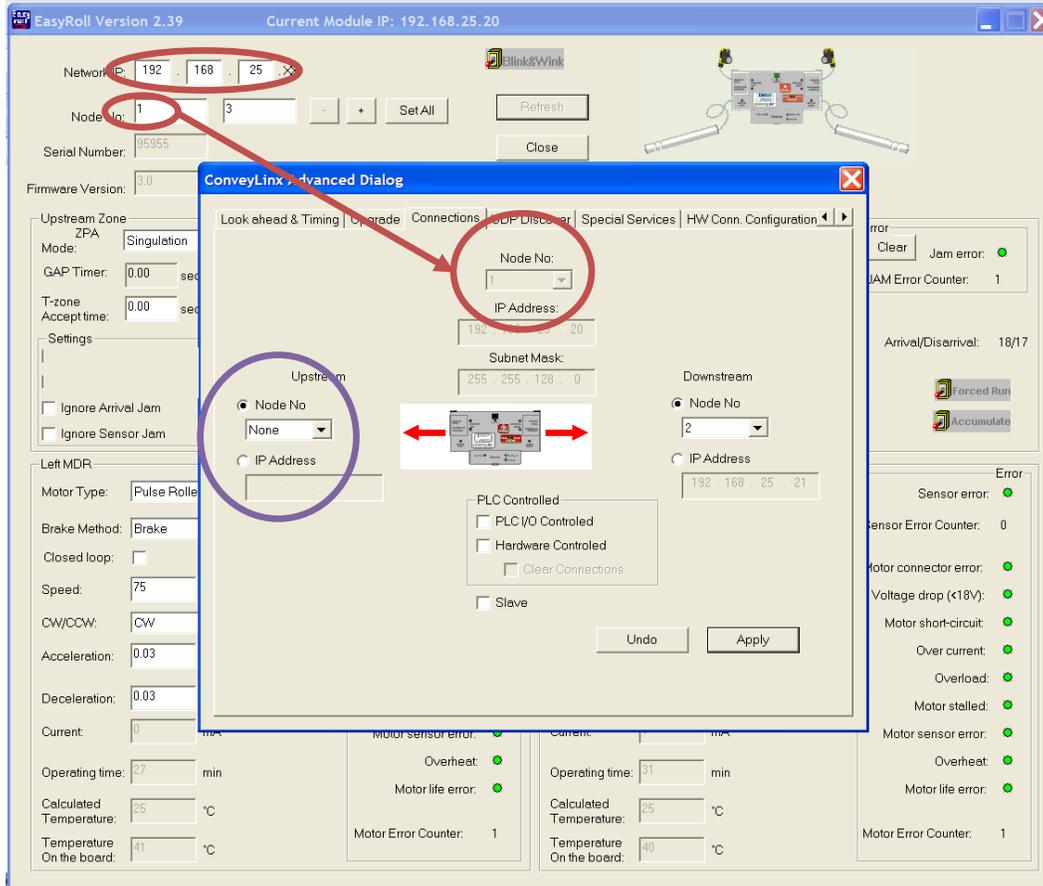


From the main screen, first enter the correct _Subnet_ into the "Network IP" boxes and the correct _Node_ you want to connect.  In this case we know that xxx.xxx.xxx.20 is _Node_ 1 for this particular _Subnet_.

Invoke the _ConveyLinx Advanced Dialog_ and select the _Connections_ tab.

Note that the _Node_ is being viewed is in the center and it is greyed out.  Also note that its Upstream designation indicates "None".
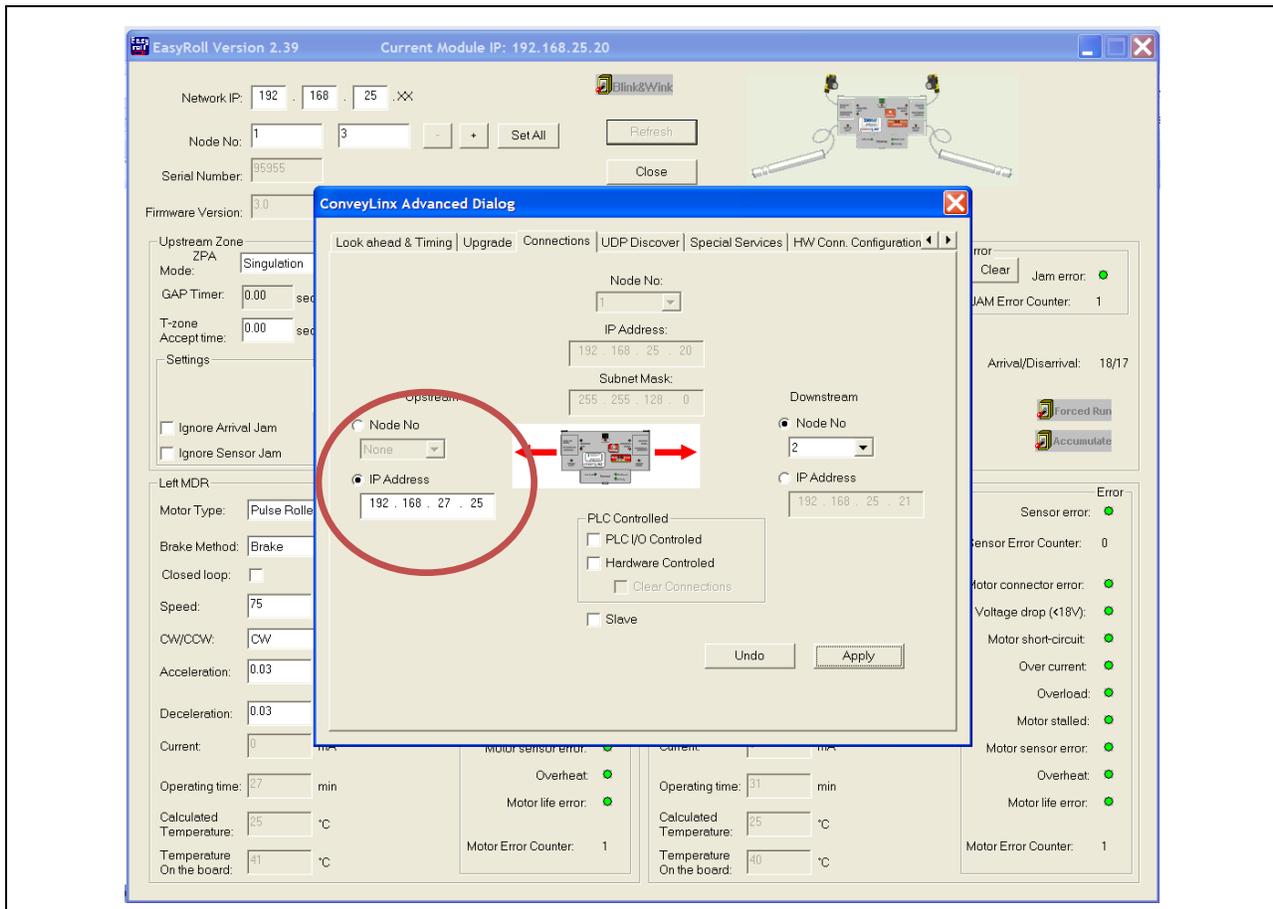
We want to tell this *Node* to accept loads from I.P. address 192.168.27.25 which is the next upstream *Node*.

Click the IP Address button and enter the correct I.P. address value and click the "Apply" button.

Please note that this will take approximately 20 seconds for the module to accept the change and restart.

Now we are complete and loads should flow from *Node* at 192.168.27.25 to *Node* at 192.168.25.20

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

**Please Note:** Each *ERSC* also has hard-wired functionality built-in to accomplish a simple network-to-network connection to maintain product flow. This is shown in section *Hardware Interface Cable* on page 48. The limitation of the hard-wired connection is that the release mode from upstream to downstream is always singulation. With a full logical network to network connection established through *EasyRoll* as described, full release mode capability is maintained. For example, you can seamlessly maintain *Train* or *Gap Train* modes through the network boundary.

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

### NETWORK SERVICES

The *Network Services* screen is used to both explore any networks reachable by the PC for any *ERSC* modules and it is used to set the I.P. address of a selected *ERSC*. Refer to section *Using the UDP Discover Utility* on page 76 for details. The Network services screen may also be used to backup and restore via node number or IP address for later use. Please refer to the self-help pop-up dialog within the *EasyRoll* tool for more information regarding backup/restore.

### SPECIAL SERVICES

Each *ERSC* maintains a running time meter for each MDR connected to it. This value is displayed as *Operating Time* on the main screen (5). This screen on the *ConveyLinx Advanced Dialog* allows you to reset this meter in the event you have to replace a given MDR.

The other function on the *Special Services* screen 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 *ERSC* be powered down and then powered back up or by clicking the "Reset" button on this screen. This function is made available in *EasyRoll* as a convenience so you don't have to cycle the power on the *ERSC*.

### CONTROL PORTS CONFIGURATION

Each of the two *Control* ports on the *ERSC* has a default "out-of-the-box" configuration state of the meanings of the expected inputs and provided output signals. This screen dialog will let you change or "invert" the logical on or off state required for the particular signal.

| | |
|---|---|
| By default, the *ERSC* interprets the "Infeed/Discharge" input signal (Interlock Pin 4 on RJ-12 *Control Port or P4 on a SE3*) when energized or ON to mean a logical "1".  By clicking the check box to invert the "Infeed/Discharge" input signal, a de-energized or "OFF" condition will mean a logical "1" to the *ERSC*for the Interlock Pin 4 *Control Port* signal. *(Refer to the Easyroll Tool Pop-Up Dialogue for detailed description of operation when checking this option in Control Ports.)* |  |
| By default, the *ERSC* interprets the "Accumulation" input signal (Pin 3 on RJ-12 *Control Port*) when energized or ON to mean a logical "1".  By clicking the check box to invert the "Accumulation" input signal, a de-energized or "OFF" condition will mean a logical "1" to the *ERSC*for the Pin 3 *Control Port* signal. *(Refer to the Easyroll Tool Pop-Up Dialogue for detailed description of operation when checking this option in Control Ports.)* |  |
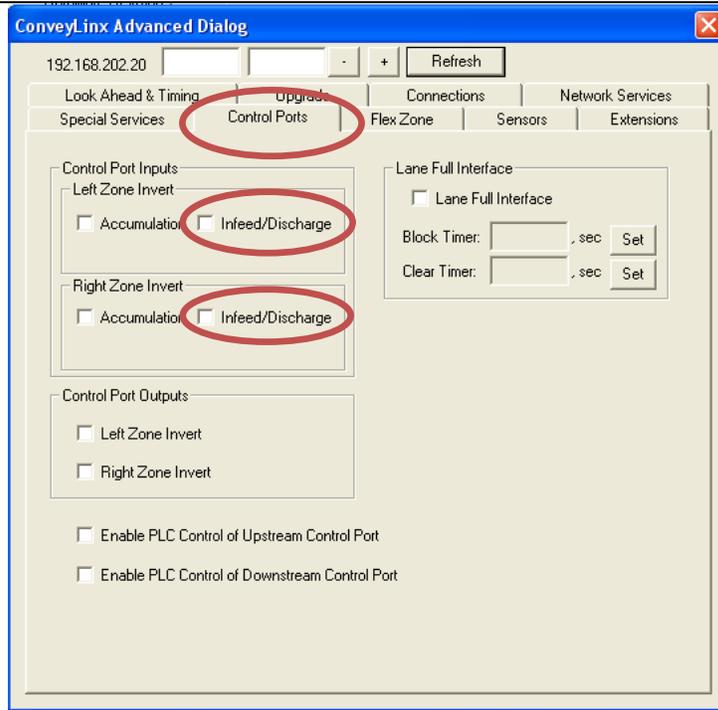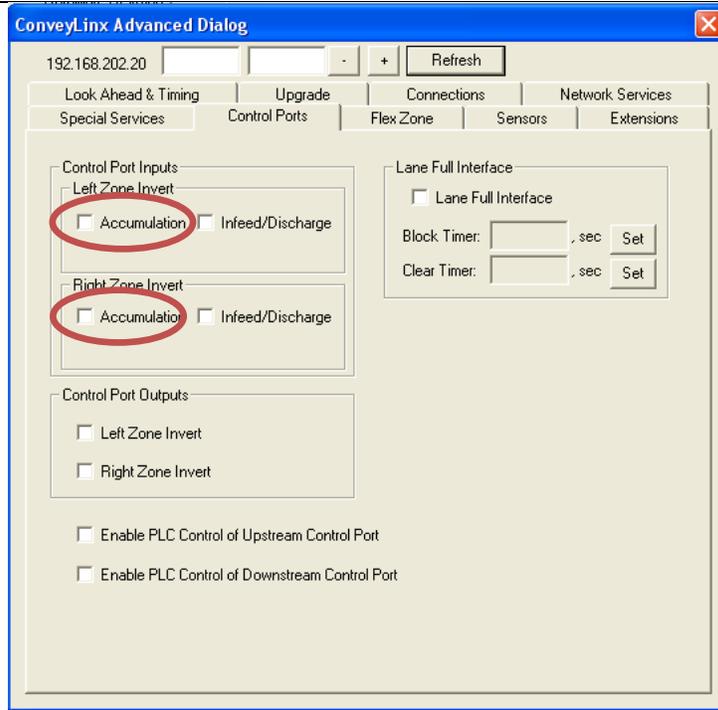
The default *Control* port output configuration signal is "ON" or logical "1" to indicate to external controls that it's associated zone is occupied.  By clicking the associated "Zone Invert" check box, the *ERSC* will make the output "OFF" or logical "0" when its associated zone is occupied. *(Refer to the Easyroll Tool Pop-Up Dialogue for detailed description of operation when checking this option in Control Ports.)*
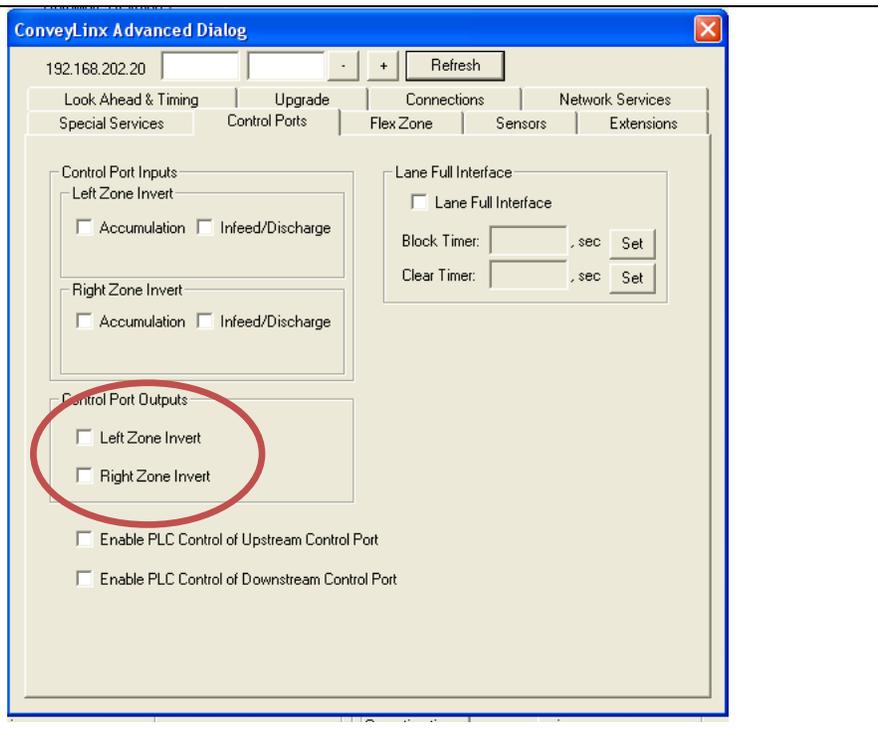


Please note that the left and right *Control* ports can be configured independently for maximum flexibility.

Any change of these signals from the default "out-of-the-box" settings will cause the hardware module to module connection as described in section *Hardware Interface Cable* on page 48 to **no longer operate as expected**.  You must return **both** *ERSC* modules in this scenario back to default *Control* port hardware settings for module to module connection to operate properly.

Section *Sensor in Control Port for Downstream Interlock* on page 51 describes plugging a sensor into the *ERSC Control Port* to provide a Downstream Interlock signal.  The hardware Connections Configuration tab provides selection and adjustment to this functionality to allow the plugged in sensor to provide "Lane Full Interface" functionality that is typical in conveyor applications.   With "Lane Full Interface" checkbox checked; the "Downstream Interlock" will change its default functionality to essentially ignore the arrival signal from the downstream controls and thus eliminate the logical "No Arrival Jam" condition.  This will allow the downstream zone to continually release as long as the sensor signal is OFF (default).  This option also allows the user to set a block and clear time for the sensor for added flexibility.

When a sensor is plugged into the downstream *Control Port*, enabling the Lane Full Interface causes the zone to ignore the downstream arrival interlock. Block and Clear timers are provided to adjust the behaviour of product flow based upon the blocking and clearing of the sensor. *(Refer to the Easyroll Tool Pop-Up Dialogue for detailed description of operation when checking this option in Control Ports.)*
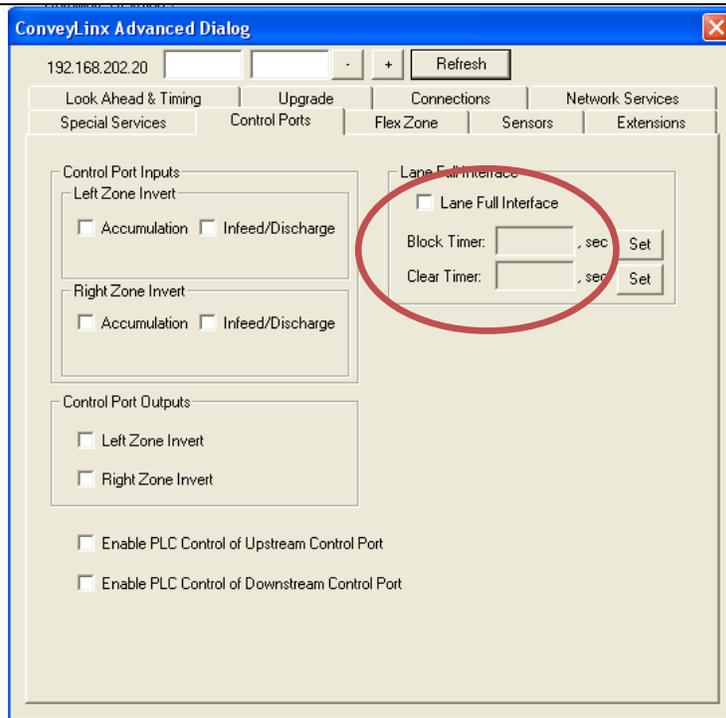


The default PLC *Control for Upstream/downstream* is off. By clicking the Enable PLC Control of Upstream or downstream allows a PLC to control the input and outputs of the respective port you enabled while keeping ConveyLinx standard ZPA faction intact. *(Refer to the EasyRoll Tool Pop-Up Dialogue for detailed description of operation when checking this option in Control Ports.)*
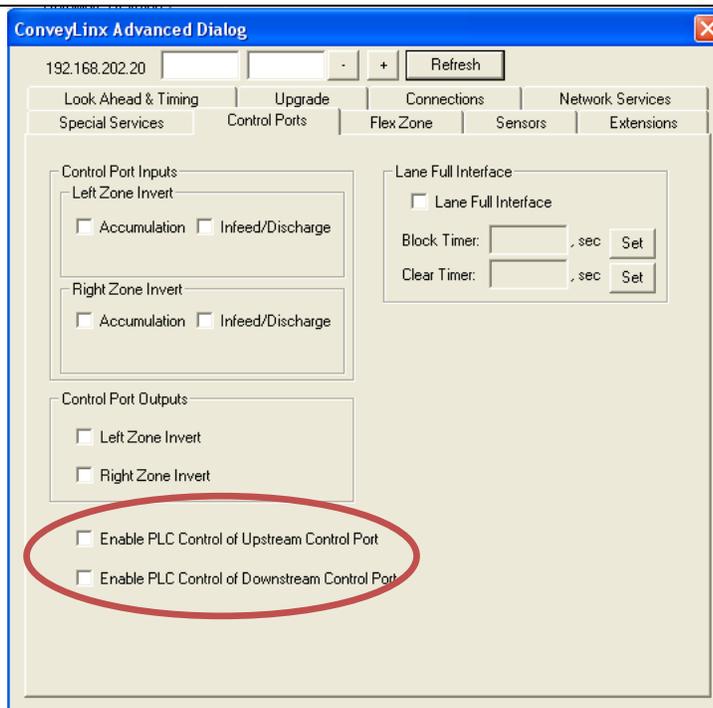
## FLEX ZONE

ERSC 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 operates for both singulation and train release mode.  This tab allows you to either enable or disable the feature.

> 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 group of zones within the same subnet.

## SENSORS

The sensors tab displays the status of how the sensor was configured during the initial "Auto Configuration" of the system.  For example, if all the sensors on the system are light energized normally open then the corresponding zone's sensor will show "off blocked".  Use this tab to change each modules default sensor configuration to match what is existing. *Please refer to the EasyRoll Tool's self-help pop up dialog for more details regarding changing the sensor's or sensor's error state after auto-configuration.*
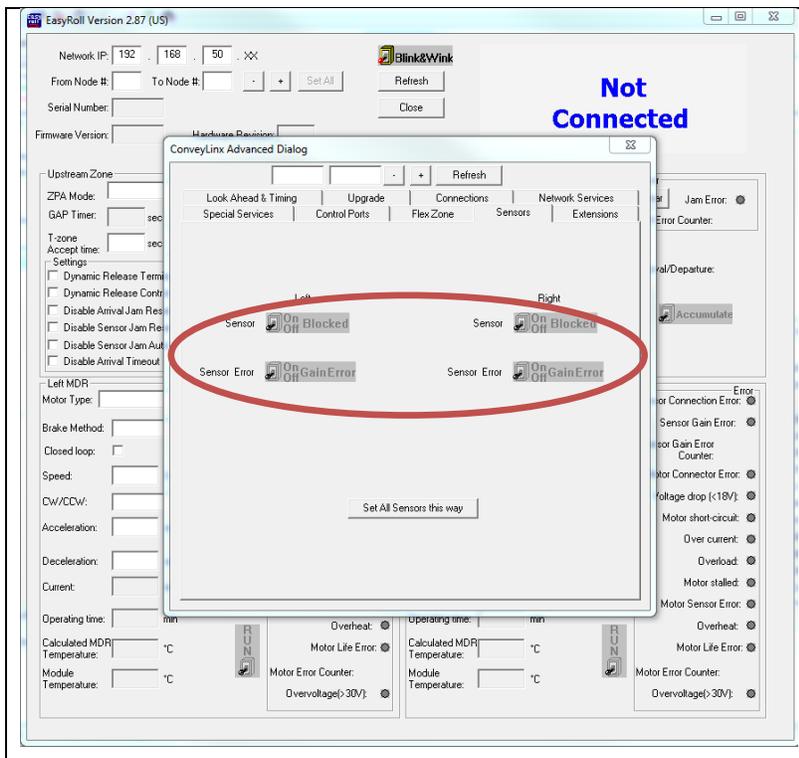


## EXTENSIONS

The Extension tab allows you to extend or "slave" a single or multiple zones to one "master" zone.  By going to the upstream or downstream node of the module you'd like to extend you can select   "This module (*current node*) is an extension of the downstream or upstream (*node that you'd like for the current node to extend to*).   One example of extensions in use can be found in the appendix section *Using Extensions for a Lift Gate on page 123. You can also refer to the EasyRoll Tool Pop-Up dialog for detailed description of operation when checking this option in Control Ports.*)
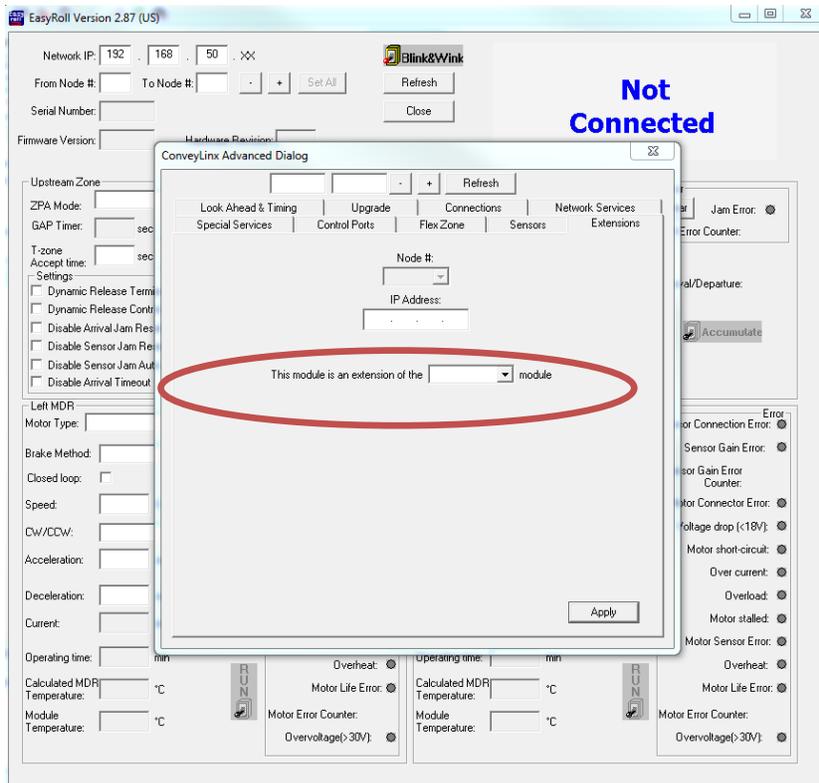


### NETWORK LOCK FEATURE

The Lock Feature allows the User to "Lock" the Network. With Lock Enabled, there can be no changes to the Network without connecting with *EasyRoll*. The "Install" Feature is disabled with Lock Enabled. The Lock Feature has NO affect on the Replacement Procedure.

To Lock a Network(s) or part of a Network(s), first select Discovery. Next, select the desired Modules and press "Lock Selected Network". The "Locked" icon appears next to the selected Modules.

To Unlock a Network(s) or part of a Network(s), first select Discovery. Next, select the desired Modules and press "Unlock Selected Network". The "Unlocked" icon appears next to the selected Modules

Notice the "Padlock" icon next to the Discovered Modules in a Locked and Unlocked Network:

LOCKED NETWORK
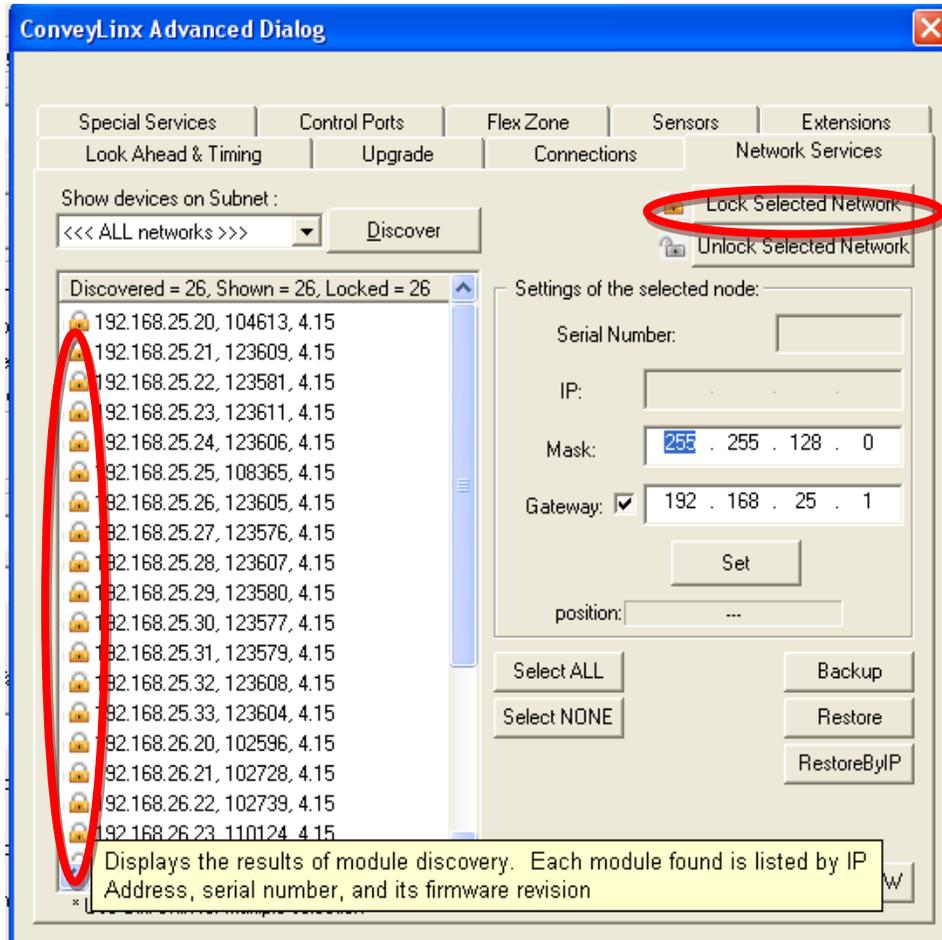
## UNLOCKED NETWORK
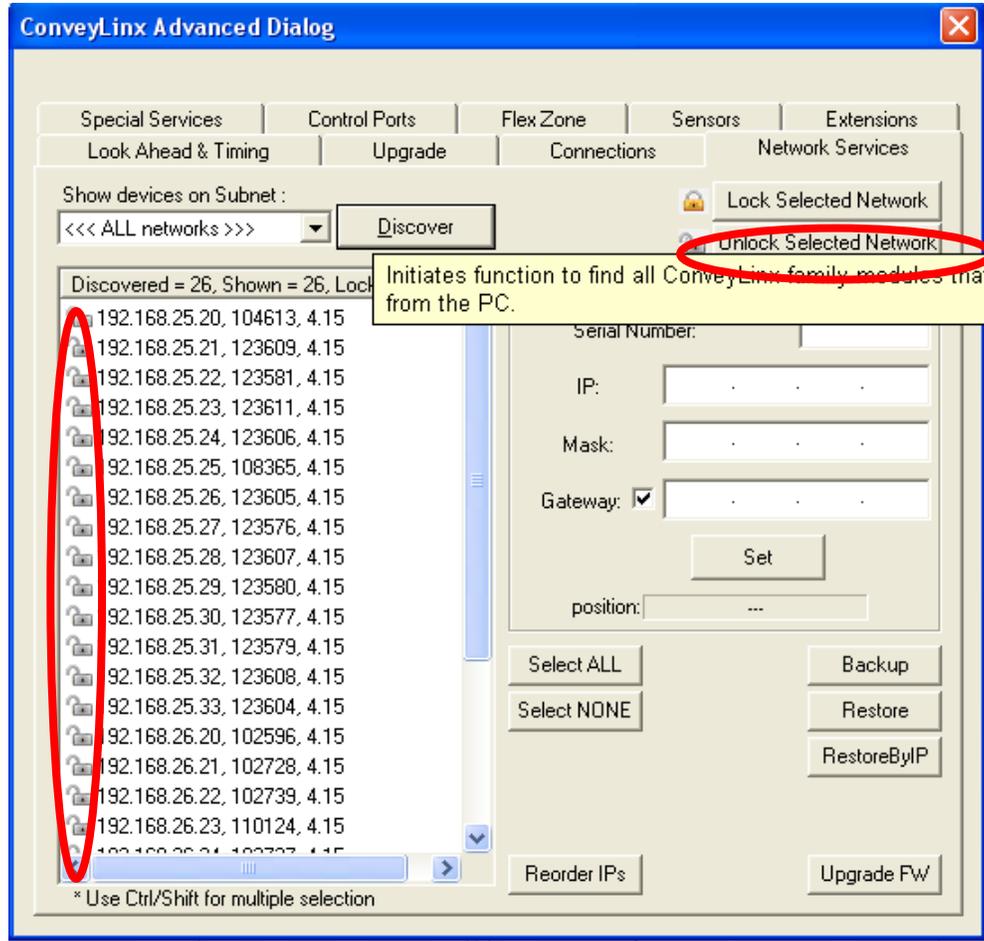
## Appendix A – Dimensions and Mounting Information

### ConveyLinx Module Dimensions

Dimensions in mm
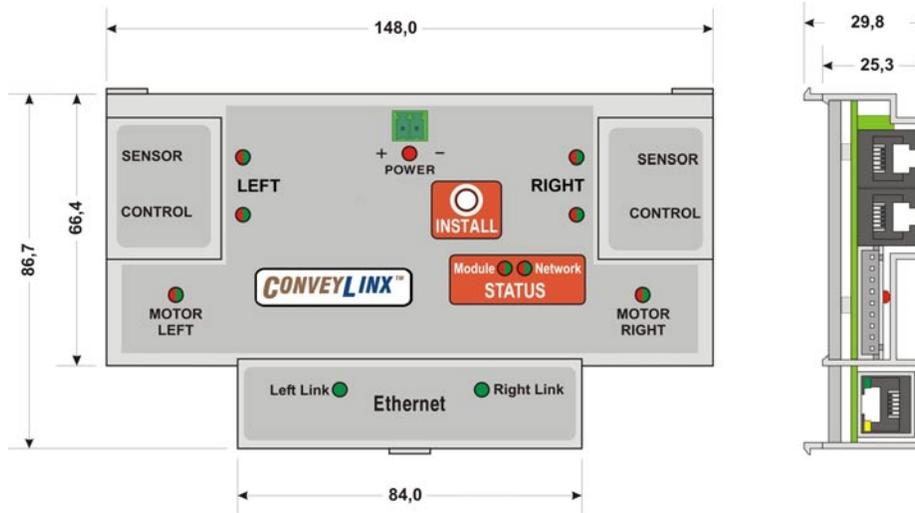


### Conveyor Frame Fabrication Detail
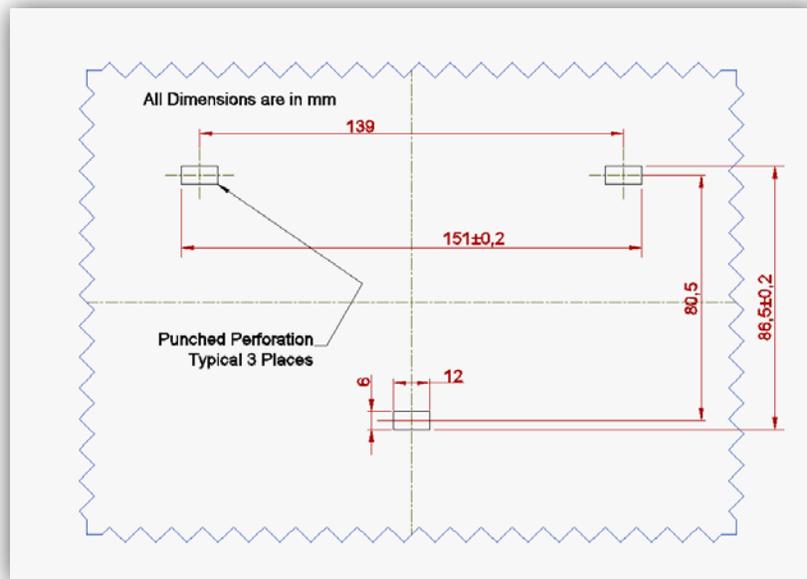


FIGURE 51 - CONVEYOR SIDE FRAME ELEVATION VIEW OF PERFORATION
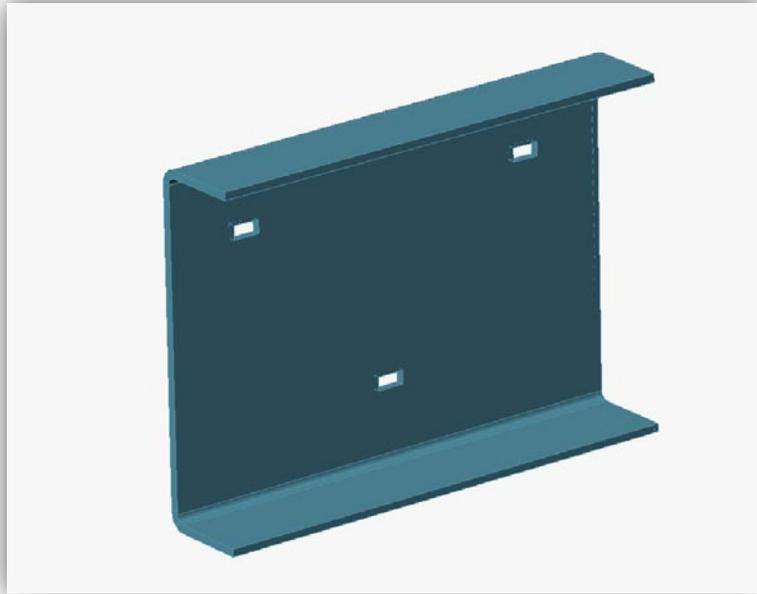
**FIGURE 52 - PERFORATION PATTERN FOR CONVEYOR SIDE FRAME**
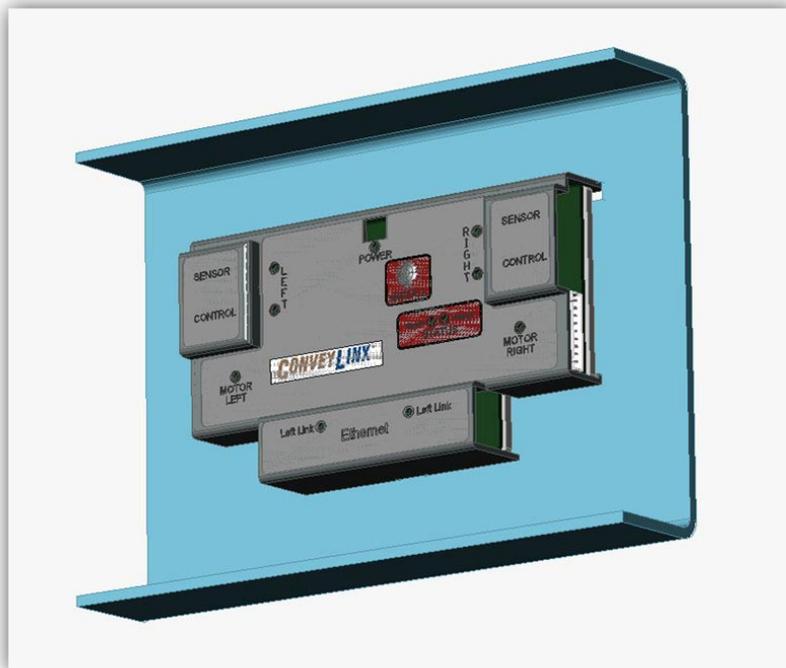


**FIGURE 53 - TYPICAL RAIL SECTION WITH ERSC MOUNTED**

# APPENDIX B–CONFIGURING PC FOR ETHERNET SUBNETS

## CONVEYLINX, IP ADDRESSES, AND SUBNETS

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

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

<div align="center">

AAA.BBB.CCC.DDD

</div>

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

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

The following figure shows some typical values for *Subnet Mask* and the resulting number of *Subnets* that can be addressed:
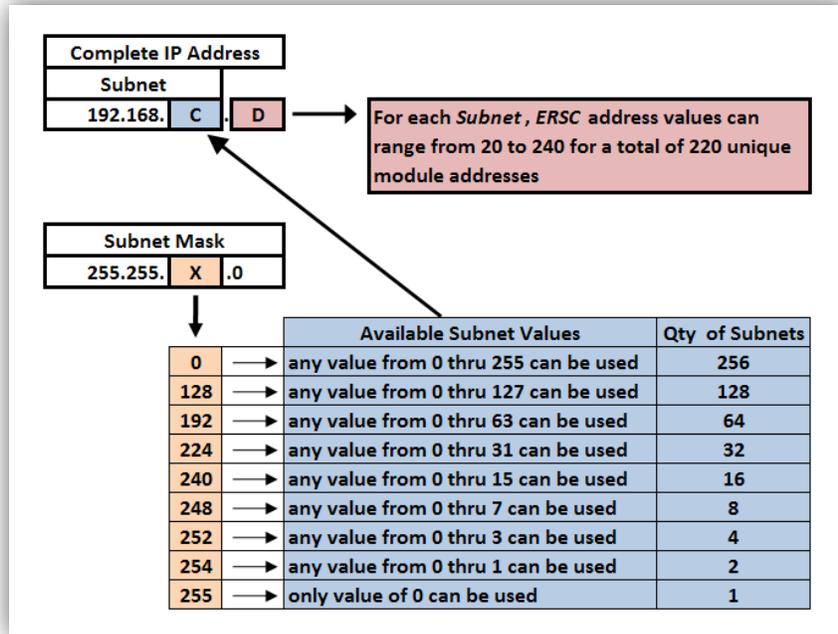
**FIGURE 54 - AVAILABLE SUBNETS PER TYPICAL SUBNET MASK VALUES**

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

## CONFIGURATION EXAMPLE

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

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

The following figure illustrates how we want our PC's I.P. address settings to be configured:
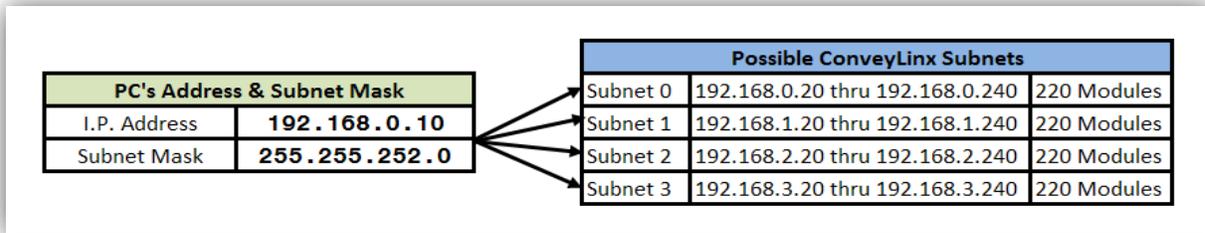
**FIGURE 55 - IP ADDRESS CONFIGURATION EXAMPLE**

**Please Note:**  The *ConveyLinx* IP address structure is designed such that all *ERSC's* last *octet* (DDD) of their address is greater than or equal to 20 and less than or equal to 240.  This leaves 36 spare valid addresses (256 – 220 = 36) on the same *Subnet* for other devices such as PC's and PLC's.  In our example, the last *Octet* for the PC's I.P. address is arbitrarily set to 10.  This value could be any value from 0 to 19 or 241 to 255.  Network conventions are such that on a given *Subnet* the last octet (DDD) values of 0 and 1 are usually reserved for the *Default Gateway* which is often the address of an Ethernet router.

Also note that our example is utilizing all the possible *Subnets* for the Subnet Mask (255.255.252.0) shown.  From Figure 54 above; we could have selected any of the values for X on the chart that was listed above the 252 value. In these cases there would simply be more *Subnets* available to address.

CHANGE PC'S IP ADDRESS PROCEDURE

To change your PC's I.P. address, click *Start – Control Panel – Network Connections – Local Area Network*.  This will display your Local Area Connection Status window (1).  From this window, click *Properties* (2) and it will display your Local Area Connection Properties window (3).  Scroll down the selection box and single click to select *Internet Protocol (TCP/IP)* (4).  Then click the *Properties* button (5):
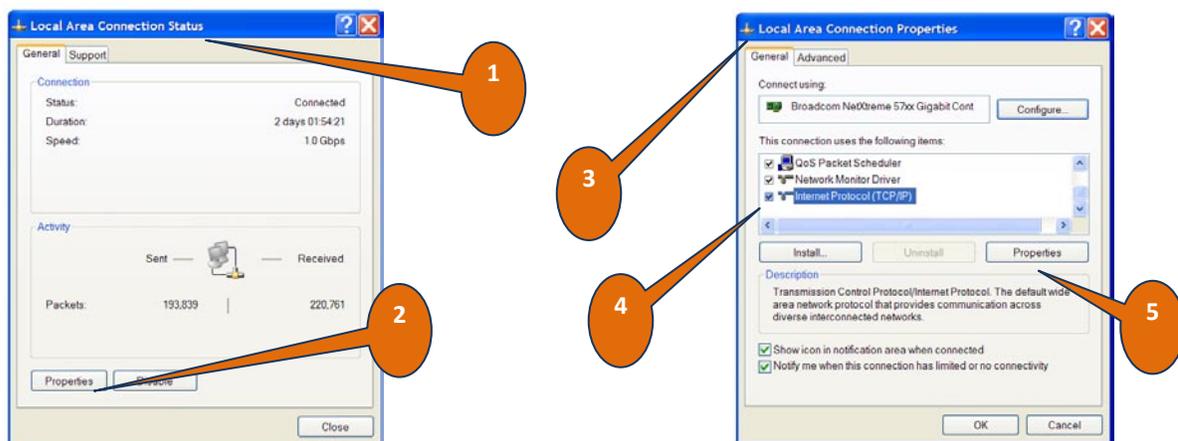


When you click properties (5), the Internet Protocol (TCP/IP) Properties window appears.  For this example, we are assuming that your PC is being assigned its I.P. address by your office network.  This is indicated by the text entry boxes in this window being greyed out.  Click on the selector button for *Use the Following IP address* (6) and the text entry boxes will become active to allow entry.
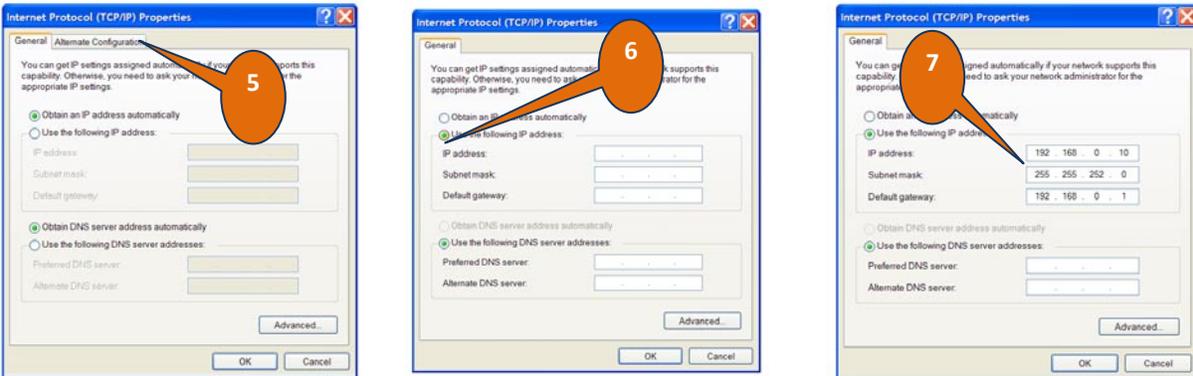
Per our example, we need to enter the IP address, subnet mask and default gateway values (7) and click OK for the settings to take place.  Please note in (7) that we entered a value into the *Default gateway* field.  This may or may not be required depending on whether your network has a specific router device.  In most cases, this value is the same *Subnet* as the IP address field and its last octet (DDD value) is usually 0 or 1.

**Please consult your I.T. department if you are unsure about modifying your PC's IP Address.**

Upon reaching item 5; if your PC has a values entered for IP address, Subnet mask, and Default gateway; **be sure to record these values before you click the button in item 6**.  Once you click the *Use the following IP address* button in item 6, these values will be lost!

Once you are done with communicating with your *ConveyLinx* network(s) and you need to return you PC to its previous network settings; simply follow this procedure again and re-enter the previous values you recorded.

## APPENDIX C – CONVEYLINX ACCESSORIES

Included in this manual are various details for you to assemble your own various cable assemblies, connection kits, and power supplies to provide a successful installation.  However, Insight Automation has made it easy for you to purchase approved and proven *ConveyLinx* accessories.  Please contact Insight Automation for pricing and delivery.

| Accessory | Part Number | Description |
|---|---|---|
| Motor Extension | CACRSC-EXT-050 | Motor Extension Harness – 50 cm |
| | CACRSC-EXT-100 | Motor Extension Harness – 100 cm |
| | CACRSC-EXT-150 | Motor Extension Harness – 150 cm |
| | CACRSC-EXT-200 | Motor Extension Harness – 200 cm |
| | CACRSC-EXT-250 | Motor Extension Harness – 250 cm |
| | CACRSC-EXT-300 | Motor Extension Harness – 300 cm |
| Module to Module Hardware Interlock | IN-STR-RJ12-015 | 8 Inch Patch Straight Cables with RJ12 Connectors. 6Pin \| 6 Conductor. |
| | IN-STR-RJ12-100 | 1Meter Patch Straight Cables with RJ12 Connectors. 6Pin \| 6 Conductor. |
| | IN-STR-RJ12-200 | 2 Meter Patch Straight Cables with RJ12 Connectors. 6Pin \| 6 Conductor. |
| | IN-STR-RJ12-300 | 3 Meter Patch Straight Cables with RJ12 Connectors. 6Pin \| 6 Conductor. |
| Shielded Ethernet Patch Cable | IN-CAT5-1-100601BK | Cat 5 - 1' Ethernet Shielded Patch Cable - Black Overmold |
| | IN-CAT5-3-100603BK | Cat 5 - 3' Ethernet Shielded Patch Cable - Black Overmold |
| | IN-CAT5-5-100604BK | Cat 5 - 5' Ethernet Shielded Patch Cable - Black Overmold |
| | IN-CAT5-7-100605BK | Cat 5 - 7' Ethernet Shielded Patch Cable - Black Overmold |
| | IN-CAT5-10-100606BK | Cat 5 - 10' Ethernet Shielded Patch Cable - Black Overmold |
| | IN-CAT5-15-100607BK | Cat 5 - 15' Ethernet Shielded Patch Cable - Black Overmold |
| | IN-CAT5-20-100616BK | Cat 5 - 20' Ethernet Shielded Patch Cable - Black Overmold |
| | IN-CAT5-25-100608BK | Cat 5 - 25' Ethernet Shielded Patch Cable - Black Overmold |
| | IN-CAT5-50-100609BK | Cat 5 - 50' Ethernet Shielded Patch Cable - Black Overmold |

| Accessory | Part Number | Description |
|---|---|---|
| Breakout Module | ERSC-SE4 | RJ-12 to Screw Terminal Breakout Module with Output Amplifier and Bias Diodes and a short time to ensure outputs do not initialize during the power up phase. Includes blocking diode circuit to allow external power to be used. *(By Adding "Kit" at the end of the part number now includes the necessary 8" Cable that runs between the SE and ConveyLinx module.* |
| Sensors (Offered in 1 and 2 Meters & PNP and NPN) | IN-PE-RJ11-1 | Private (Banner)Labeled Insight Photo-Eye 10-30VDC, NPN Light Operate w/ Health output RJ11 Cable 1Meter (Kit: Sensor, reflector, and brackets) |
| | IN-PPE-RJ11-1 | Private (Banner) Labeled Insight Photo-Eye 10-30VDC, PNP Light Operate w/ Health output RJ11 Cable 1Meters |
| | IN-PE-FL-1 | Private (Banner) Labeled Insight Photo-Eye 10-30VDC, NPN Light Operate WITHOUT Health output RJ-11 Cable 1 Meter long Used for Full-Lane or Wake-Up |
| DC Power Supplies*(Omit "DIS" For No Load Switch/Add "UL" after IN to make any Box UL Approved)* | IN-P-DIS-PS-10-120 | MDR\|Power 10amp@24VDC, 120VAC Input w/ Load Switch,Transparent Poly Carbonate Enclosure |
| | IN-P-DIS-PS-20-120 | MDR\|Power 20amp@24VDC, 120VAC Input w/ Load Switch, Transparent Poly Carbonate Enclosure |
| | IN-P-DIS-PS-40-120 | MDR\|Power (2) - 20amp@24VDC, 120VAC Input w/ Load Switch, Transparent Poly Carbonate Enclosure |
| | IN-P-DIS-PS-20-480 | MDR\|Power 20amp@24VDC, 480VAC Input w/ Load Switch, Transparent Poly Carbonate Enclosure |
| | IN-P-DIS-PS-40-480 | MDR\|Power 40amp@24VDC, 480VAC Input w/ Load Switch, 2 20A-Circuit Breaker, Transparent Poly Carbonate Enclosure |

## NOTES ON SE-MODULE REVISIONS

As of August 2013, Insight Automation began shipping only ERSC-SE4 modules and no longer manufactures ERSC-SE3, ERSC-SE2 modules.  Due to the smallness and simplicity of these modules, they are not individually serialized at manufacturing.  Because there is an installed base of modules prior to ERSC-SE4; the following describes the updates and warnings of usage for each of these part numbers.

### ERSC-SE2

Original design providing bias diodes for the Pin 3 and Pin 4 inputs to allow solid state PLC output modules to operate without inadvertently triggering the PNP/NPN auto detect feature of the ERSC.  This design also provided the Control Port Output amplifier to allow higher current devices to be connected to this output.  The OUT signal is PNP only.

⚠ Because the Control Port Output is in an indeterminate state upon ERSC boot up; the OUT signal could possibly momentarily energize upon initial power up or re-boot of the ERSC. Users must take proper care when using the OUT signal in their control system logic.

⚠ The 24V terminal on the ERSC-SE2 is directly connected to the ERSC's Control port power. If users connect an external power source to the 24V terminal on the SE2; this will back-feed power into the ERSC.  If this is done, when the main power to the ERSC is disconnected; the ERSC could still power up.  User must take care to not connect external power source to the 24V terminal.

### ERSC-SE3

This version contains a modification to block the OUT signal from energizing during the ERSC's initial power-up or re-boot sequence.  Thus users no longer have to worry about an inadvertent OUT signal being energized during initialization or reboot of the *ERSC*.  For convenience; an LED has been added that illuminates when the OUT signal is being energized.

⚠ The 24V terminal on the ERSC-SE3 is directly connected to the ERSC's Control port power. If users connect an external power source to the 24V terminal on the SE3; this will back-feed power into the ERSC.  If this is done, when the main power to the ERSC is disconnected; the ERSC could still power up.  User must take care to not connect external power source to the 24V terminal.

### ERSC-SE4

This version contains a diode circuit that blocks an external power source from back-feeding into the ERSC's Control Port power.  Users can now provide external power for devices connected to the Control Port in cases where these device's power requirements exceed the maximum limits of the port.

# APPENDIX D – APPLICATION EXAMPLES

## USING EXTENSIONS FOR A LIFT GATE

The most common use of the *Extension* mode configuration available from the *Connections* tab selection is for a powered lift gate. Figure 56 shows a typical powered lift gate example. In this example the *ERSC* on the lifting or gate portion of conveyor has 2 MDR's and no photo-sensors. Normal operation when the gate is down is for the MDR's on the gate to run when its immediate downstream zone runs so as to create "one long logical zone". This means that if a load is accumulated on the upstream zone of *Node* 192.168.25.25; a load arriving at the downstream zone of *Node* 192.168.25.23 will stop and accumulate and no loads will ever be logically accumulated or stopped on the gate portion. In order accomplish this we need to first establish the logical flow from 192.168.25.23 to *Node* 192.168.25.25. Secondly, we will then instruct *Node* 192.168.25.24 to be an*Extension* to the upstream zone of *Node* 192.168.25.25.
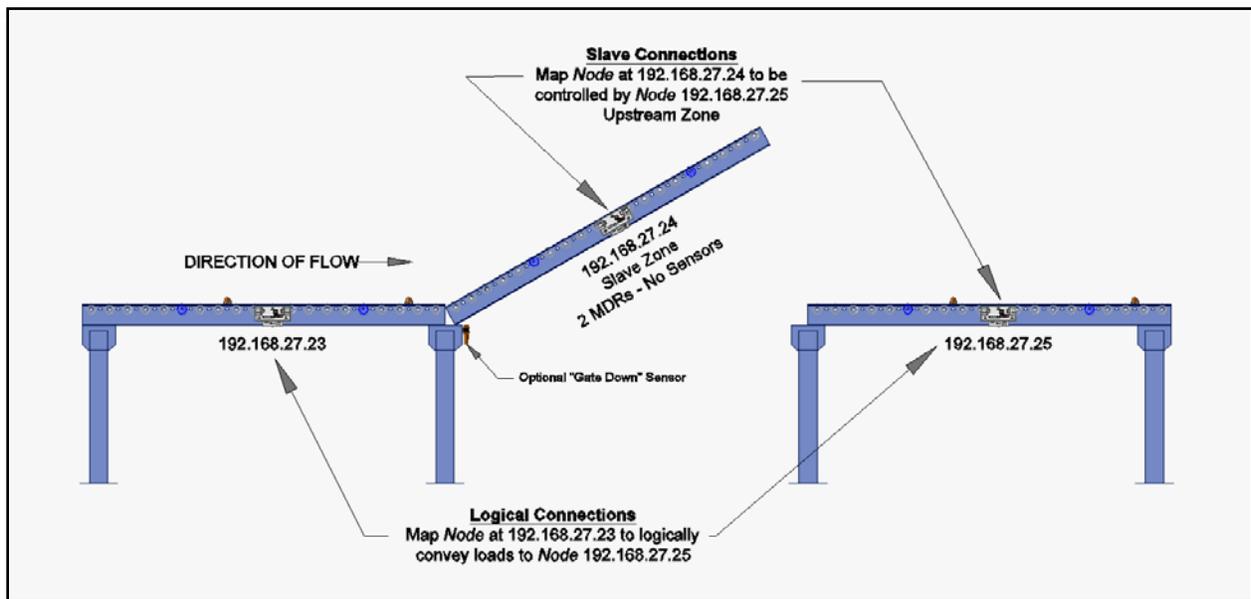


**FIGURE 56 - TYPICAL LIFT GATE EXAMPLE**
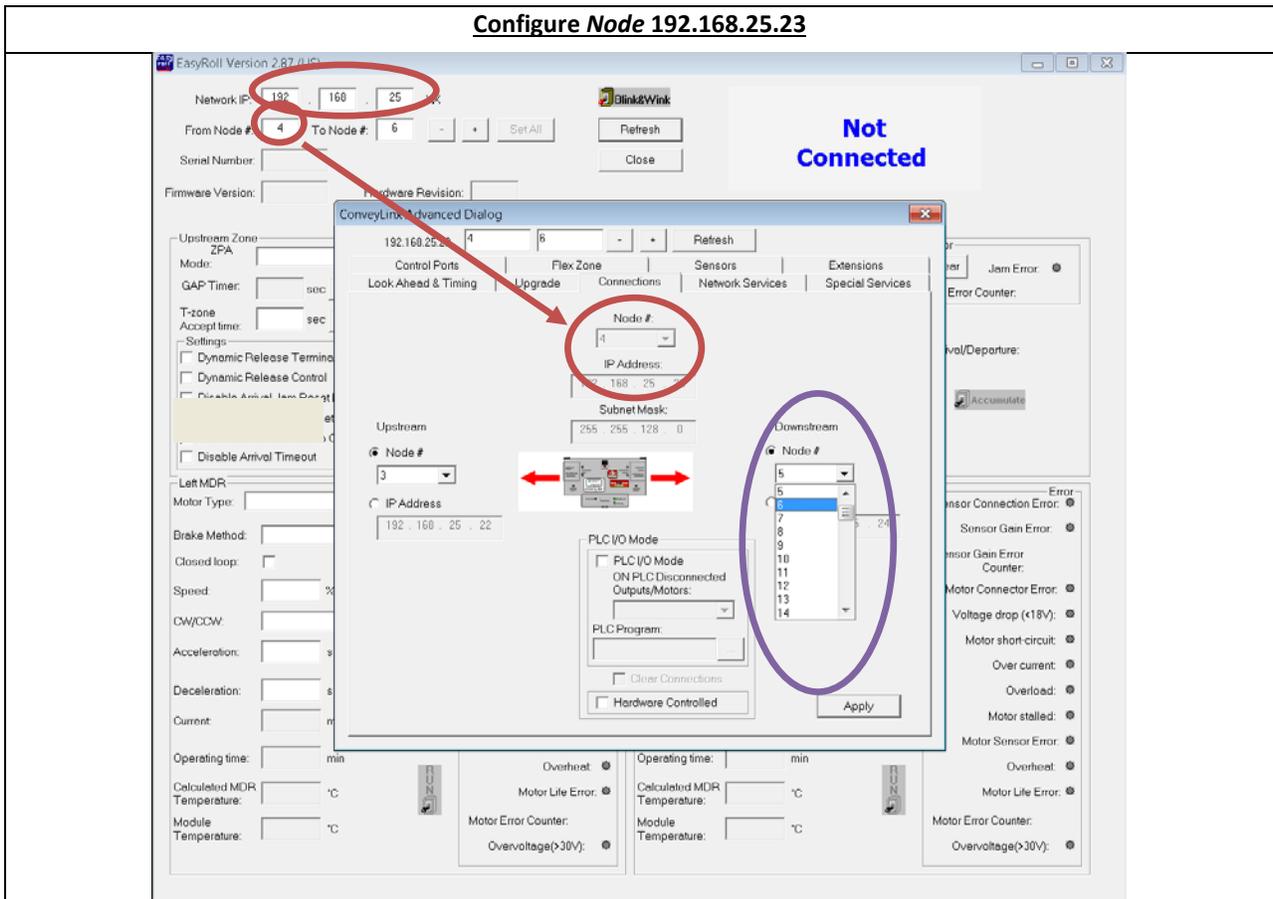
| Configure *Node* 192.168.25.23 |
|---|
|  |
| From the main screen, enter the correct *Subnet* and then select the proper *Node* within the *Subnet*.  In this case it is *Node* 4 of *Subnet* 192.168.25.  Invoke the *ConveyLinxAdvanced Dialog*.  Note that *Node* 4's information is displayed in the center and that it is greyed out. |
| From the *Auto-Configuration Procedure*, *Node* 4's natural upstream *Node* is 3 and its natural downstream *Node* 5.  In this case we want to skip over *Node* 5 because it will be our *Slave* zone.  We want *Node 6* to be the *Node* that accepts loads from *Node* 4.  Select *Node* 6 from the pull down box and click apply. |

**Configure** *Node* **192.168.25.25**
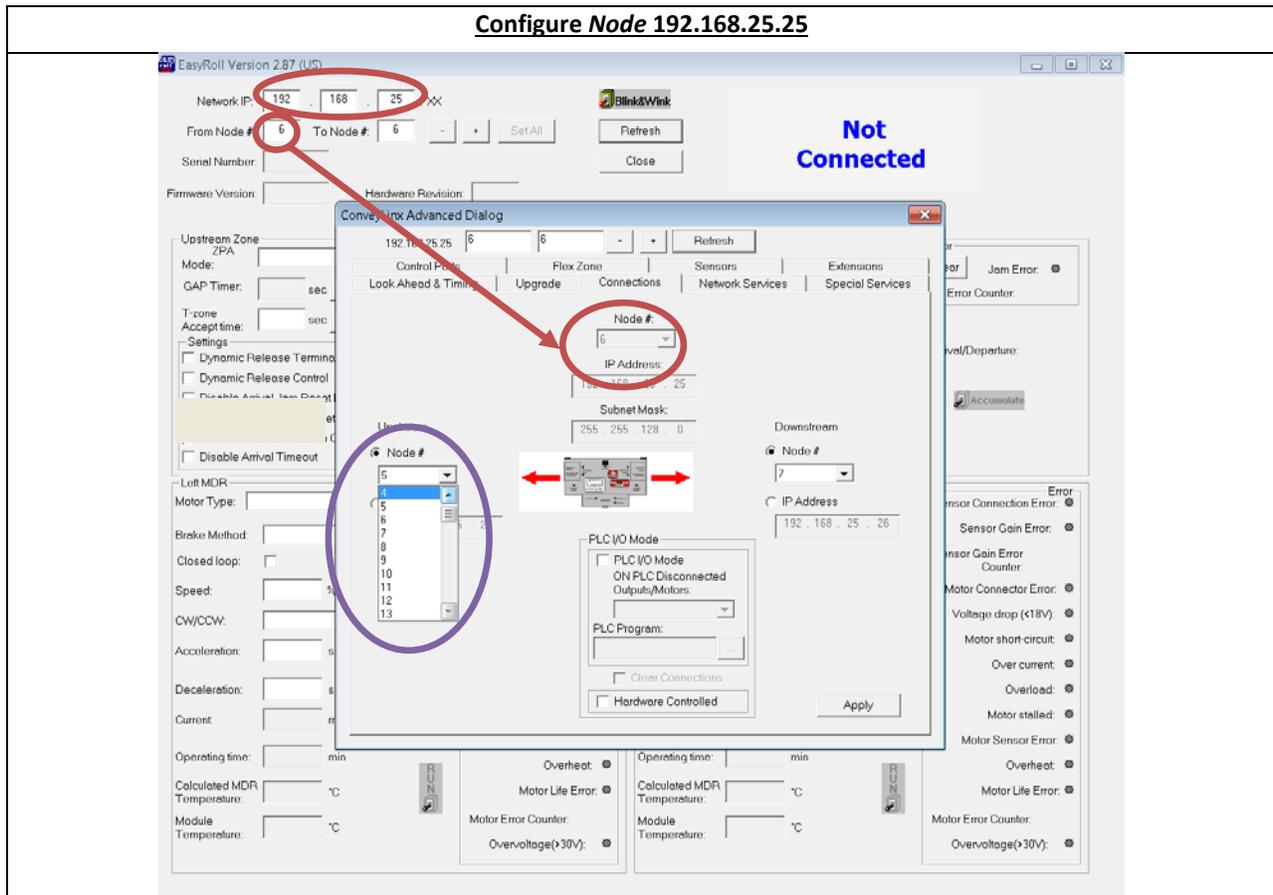


From the main screen, enter the correct *Subnet* and then select the proper *Node* within the *Subnet*. In this case it is *Node* 6 of *Subnet* 192.168.25. Invoke the *ConveyLinxAdvanced Dialog*. Note that *Node* 6's information is displayed in the center and that it is greyed out.

From the *Auto-Configuration Procedure*, *Node* 6's natural upstream *Node* is 5. In this case we want our upstream zone to be fed from *Node 4* instead of *Node* 5 because *Node 5* will be our *Slave* zone. For the Upstream zone, select *Node* 4 from the pull down box and click apply.

The Downstream can remain its default configuration for this application example.

**Configure *Node* 192.168.25.24**
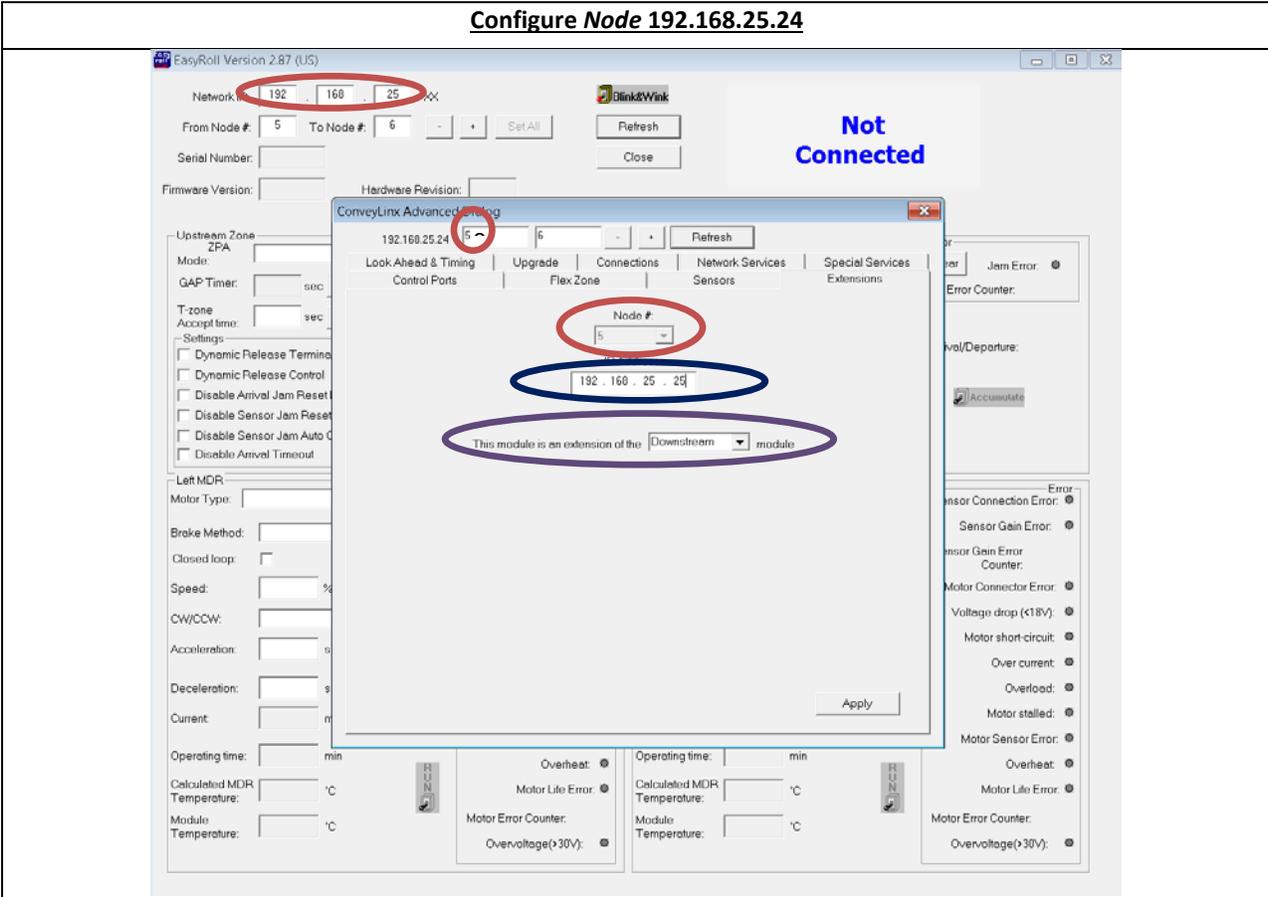


From the main screen, enter the correct *Subnet* and then select the proper *node* within the *subnet from the main screen or the advanced dialog*. In this case it is *Node* 5 of *Subnet* 192.168.25. Invoke the *ConveyLinx Advanced Dialog and select the extension Tab*. Note that *Node* 5's information is displayed in the center and that it is greyed out.

Pull down the "This Module is an extension of the " " module and select downstream.

Click apply.

In Figure 56, there is an optional "Gate Down" sensor shown. This can be provided to hard-wire back to the upstream zone *ERSC* (*Node* 192.168.25.23 in our example) to cause the upstream zone just prior to the gate to immediately accumulate product. This sensor would connect as described in section *Local Zone Accumulation Control* on page 45. For the lift gate example, the sensor would have to be selected and/or wired to give a signal when the gate is lifted to tell the upstream *ERSC* to accumulate. When the gate is down, the sensor signal should be removed from the *ERSC* to instruct its zone to convey as normal.

NOTES:

**PULSE ROLLER**

WWW.PULSEROLLER.COM
SALES@PULSEROLLER.COM
SUPPORT@PULSEROLLER.COM