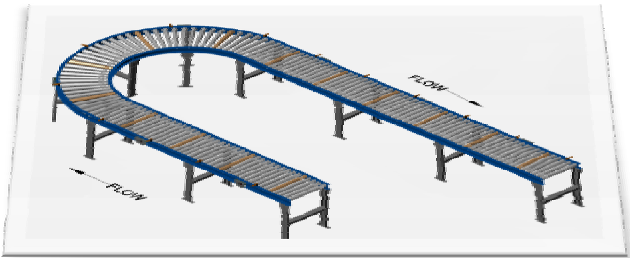
CONVEYLINX®
Ethernet Modular Conveyor Controls

User's Guide

Version 3.1

July 2010



Insight Automation 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. **Reflex** (or sometimes known as **proximity**) type **photo-sensors** emit light to be reflected back from an object located sufficiently close to the sensor. For both types of **photo-sensors**, when they detect their reflected light source, their signaling output circuit changes state.
RJ-11 / RJ-12	**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
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

Summary of Changes

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

Revision	Date	Change / Update
1.0	February 2009	Initial Release
1.1	March 02 2009	Updated cable specs
2.0	May 18 2009	General revisions, updated interlocking examples, added accessories appendix
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

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 *ConveyLinx ERSC* modules should refer to Insight Automation publication *ConveyLinx Developer's Guide* (publication *ERSC-1500*)

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 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.

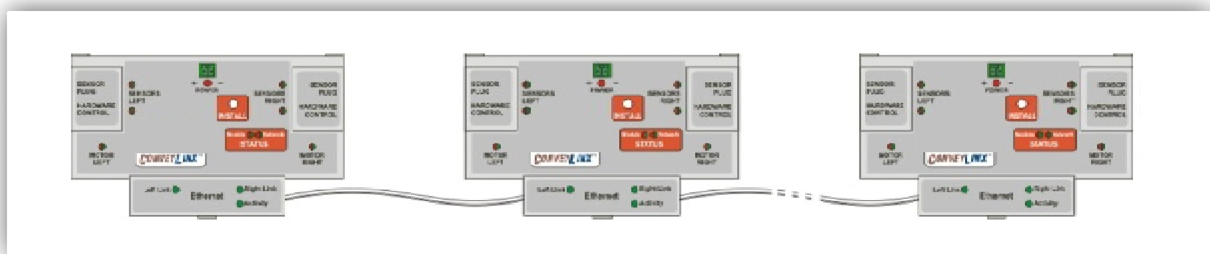


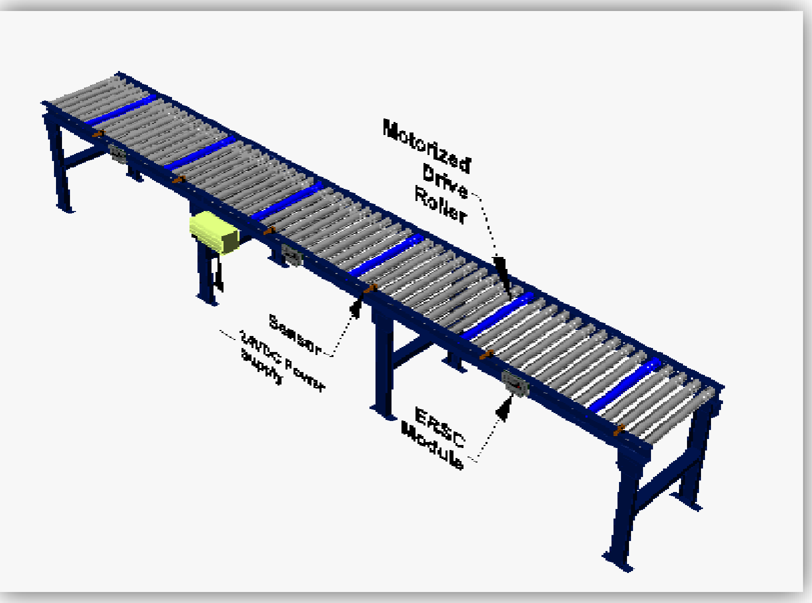
Figure 1 - ConveyLinx® Concept with ERSC Modules

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:

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



ConveyLinx® ERSC Module Features

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

- ü Built-in Ethernet switch
- ü Modular RJ style connection ports for photo-sensors and interfacing signals
- ü Modular JST style connectors for MDR
- ü Single 24VDC power connection for motor and control
- ü Context-sensitive multi-color LED indicators
- ü Thermal and over-current protection for MDR
- ü Automatic light/dark operate detection for photo-sensor inputs
- ü Automatic PNP/NPN detection for photo-sensor and hardware inputs
- ü PNP or NPN output signal options
- ü Proportional / Integral (PI) MDR speed regulation option
- ü Four MDR braking method options
- ü Adjustable acceleration and deceleration time capability
- ü MDR mechanical brake control option
- ü 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:

- ü Single zone to zone zero pressure accumulation (ZPA) control as default mode.
- ü Optional configuration for *Train Release* and *Gap Train Release* modes.
- ü Automatic *Flexible Zone Recognition* logic to detect and handle load sizes exceeding the length of one physical zone.
- ü Optional configuration for *Look Ahead Slow Down* mode for higher speed applications.
- ü Ability to bridge separate Ethernet sub-networks for seamless operation.
- ü Ability to designate an *ERSC* to be a “slave” 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 in detail the usage of the *EasyRoll* software package to gain access to the various optional configuration parameters and utilities.

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* Information on page 107 for 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.

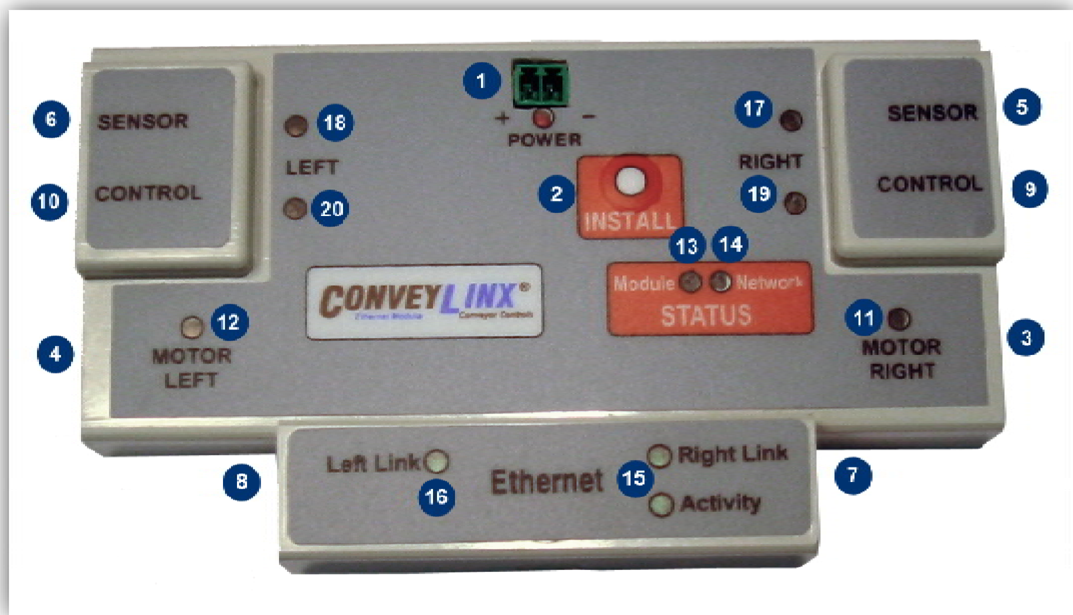


Figure 2 - ERSC Module Hardware Features Identification

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	*Sensor Left* and *Sensor Right* – 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	*Hardware control left* and *Hardware control right* – RJ-12 style ports for discreet hard-wired signal connections for non-networked interface interlocks and zone

Item	Description
	control
11 & 12	Motor Left LED & Motor Right LED – Motor status indicators
13	Module Status LED Indicator
14	Module Network Status LED Indicator
15 & 16	Left Link & Right Link Status LED Indicators and Network Activity LED Indicator
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.

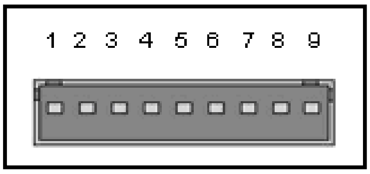


Figure 3 – JST Diagram

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:

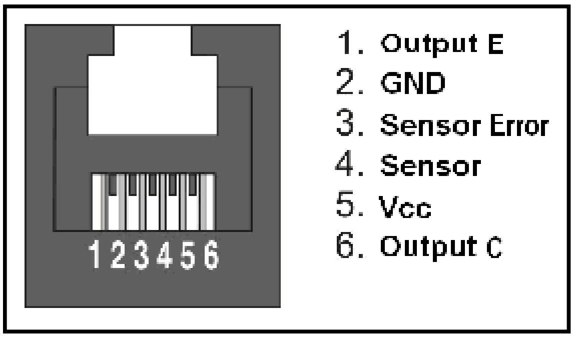


Figure 5 - Sensor Port Diagram

Figure 6 - ERSC with Sensor Plugged in

The signals are defined by the following chart:

Pin	Signal	Description
1	Output E	NPN Logic Output from Module – Reserved for Future Use
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	Output C	PNP Logic Output from Module – Reserved for Future Use

Hardware Control Left and Right 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
2	GND	Module DC Common
3	Sensor Error	Optional Zone Accumulate Control
4	Sensor	Interlock with Upstream/Downstream Module
5	Vcc	Module 24VDC Supply
6	Output C	Interlock with Upstream/Downstream Module

Ethernet Left and Ethernet Right Ports

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

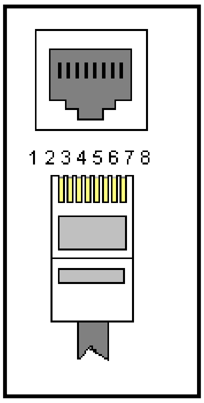


Figure 7 - Standard RJ-45 Pin-Out

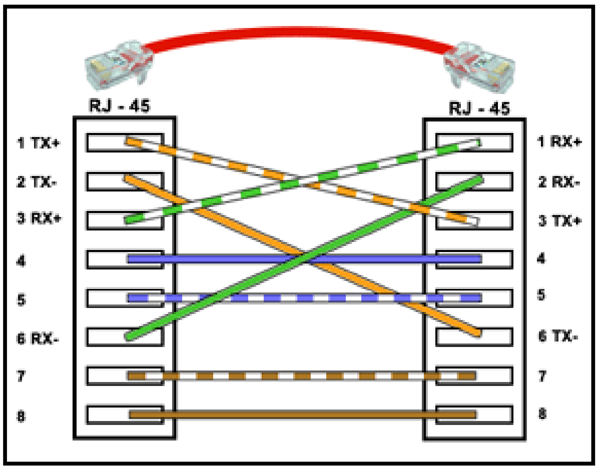


Figure 8 - Standard Ethernet Crossover Cable Diagram

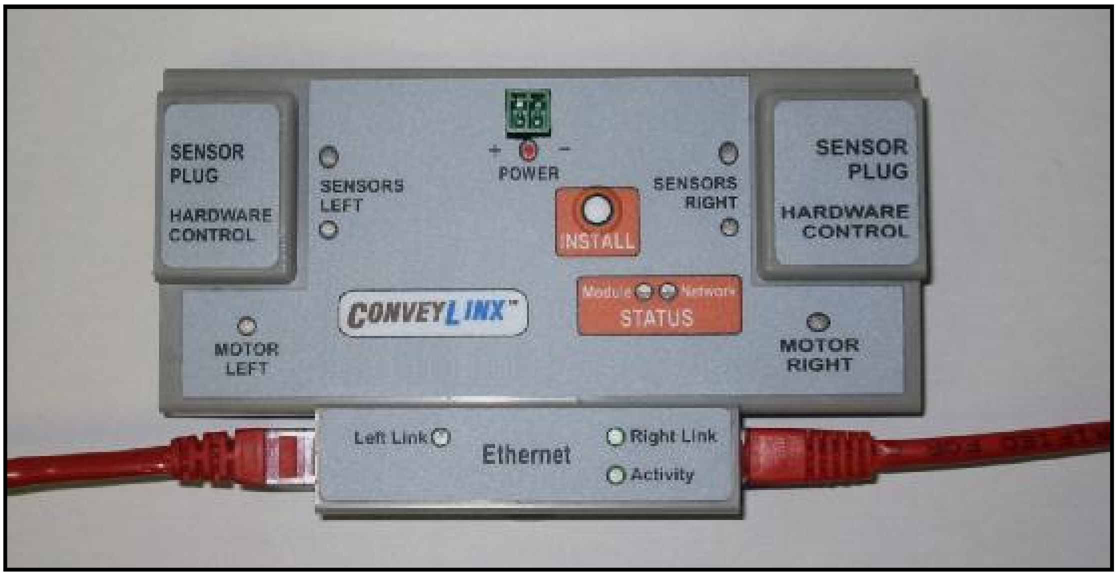


Figure 9 - ERSC with Left & Right Ethernet Cables

All Ethernet cables for connections between modules are to be <u>shielded crossover style cables</u>. Failure to use shielded cables will 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 32).

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.

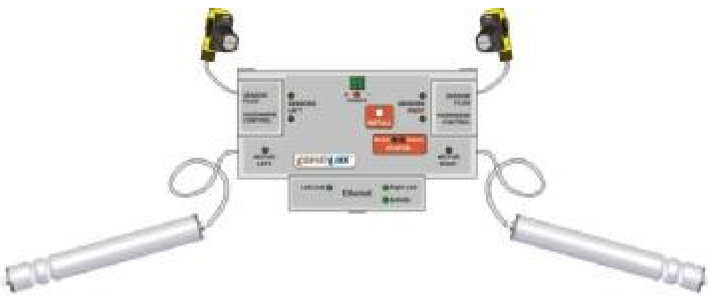
Before starting to configure your system to operate, each MDR and photo-sensor needs to be properly connected to the *ERSC* modules mounted on the conveyor. *ERSC* modules will determine how to operate based upon how the photo-sensors and MDR's are connected.

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

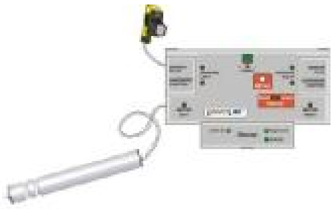
The following examples illustrate these connections.

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

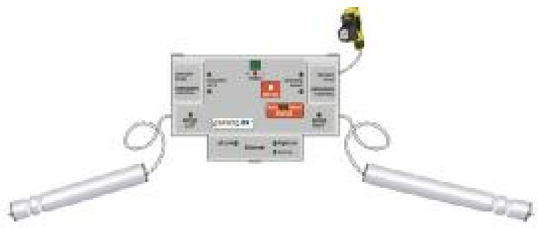


OR

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

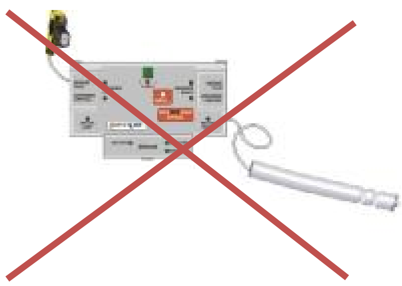
OR



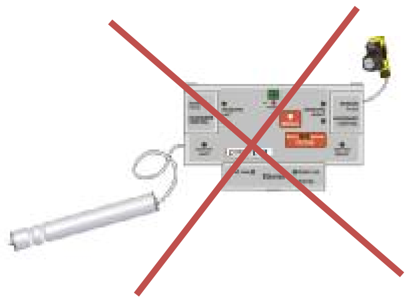
In this case the *ERSC* module will control 2 MDR's in tandem and operate as a single zone with a single photo-sensor connected to either the Left or Right port. This configuration is typical for belted zones used particularly on inclined conveyors which require the added torque of a second MDR to accommodate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

Invalid Configuration Examples

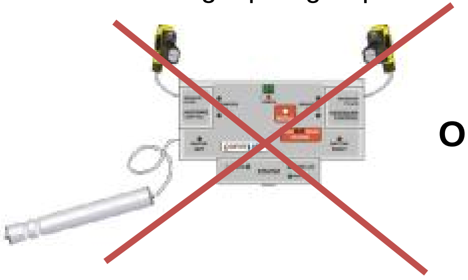
Because the *ERSC* module determines its self-configuration intention by how photo-sensors are connected; it is possible to connect photo-sensors and MDR's in invalid ways that will result in unexpected results.



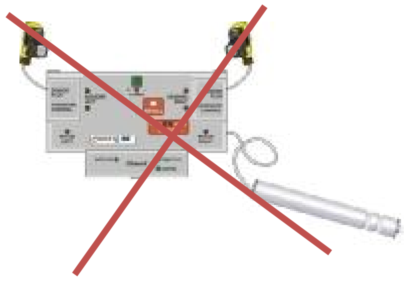
OR



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



OR



In these cases the *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 10.

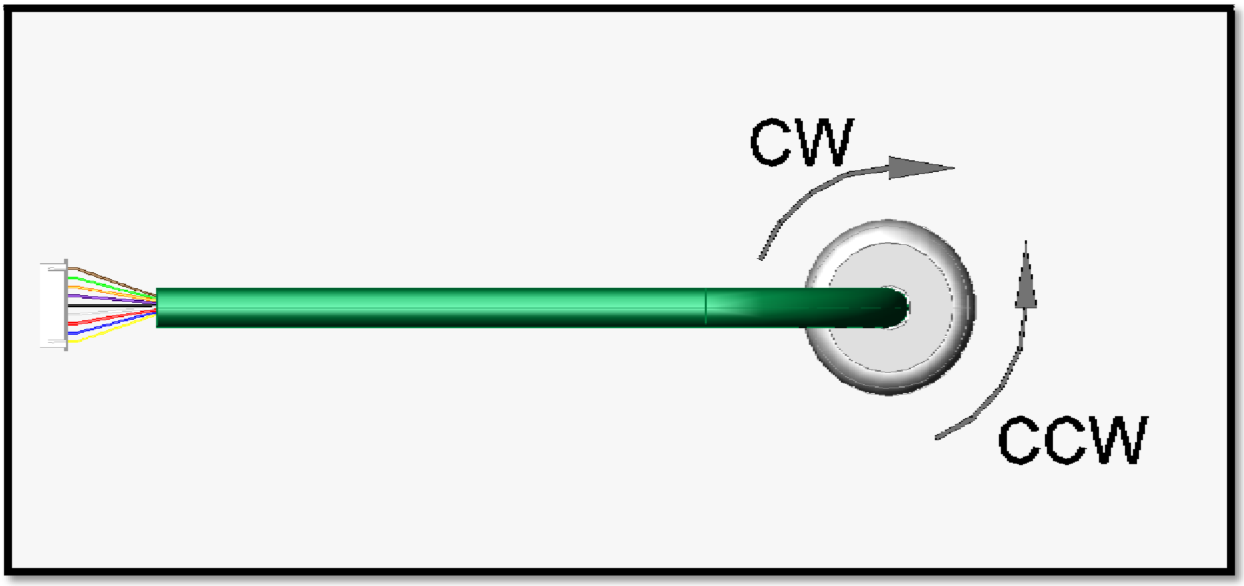
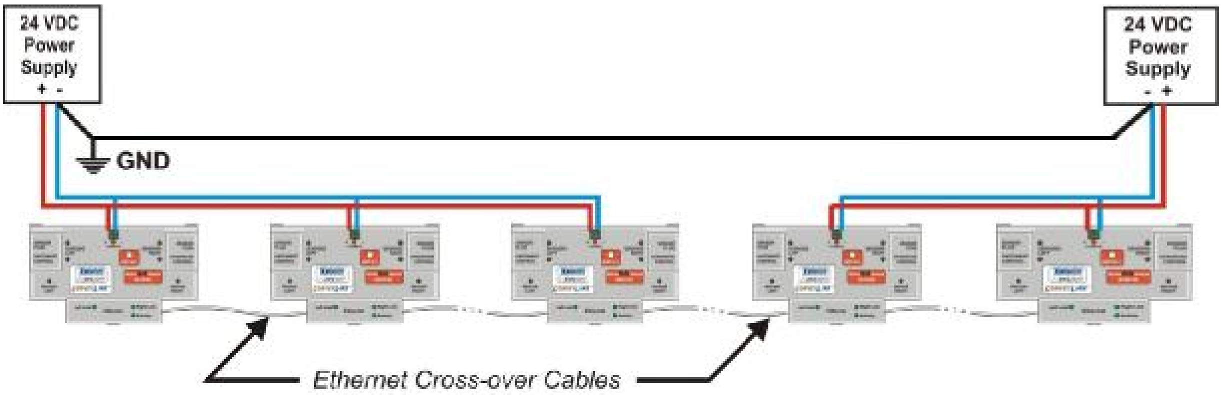


Figure 10 - Motor Rotation Direction Convention

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

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 cross-over Ethernet cables and each module needs to receive 24VDC power connection. The Power Plug connection is the power source for all logic, photo-sensors, and MDR's.



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 multicoloured and context sensitive. The following chart indicates the various meanings of all *ERSC* LED indicators. Please refer to *Figure 2 - ERSC Module Hardware Features Identification* on page 17 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
Right Link & Activity	15	OFF	No connection established
		Solid Green	Connection is established
		Blinking Green	When data transmission activity is occurring
		Blinking Green	Inter-module communications established

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

Indicator	Item	LED State	Description
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 • 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 Input energized
		Solid Red	Sensor 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 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 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.

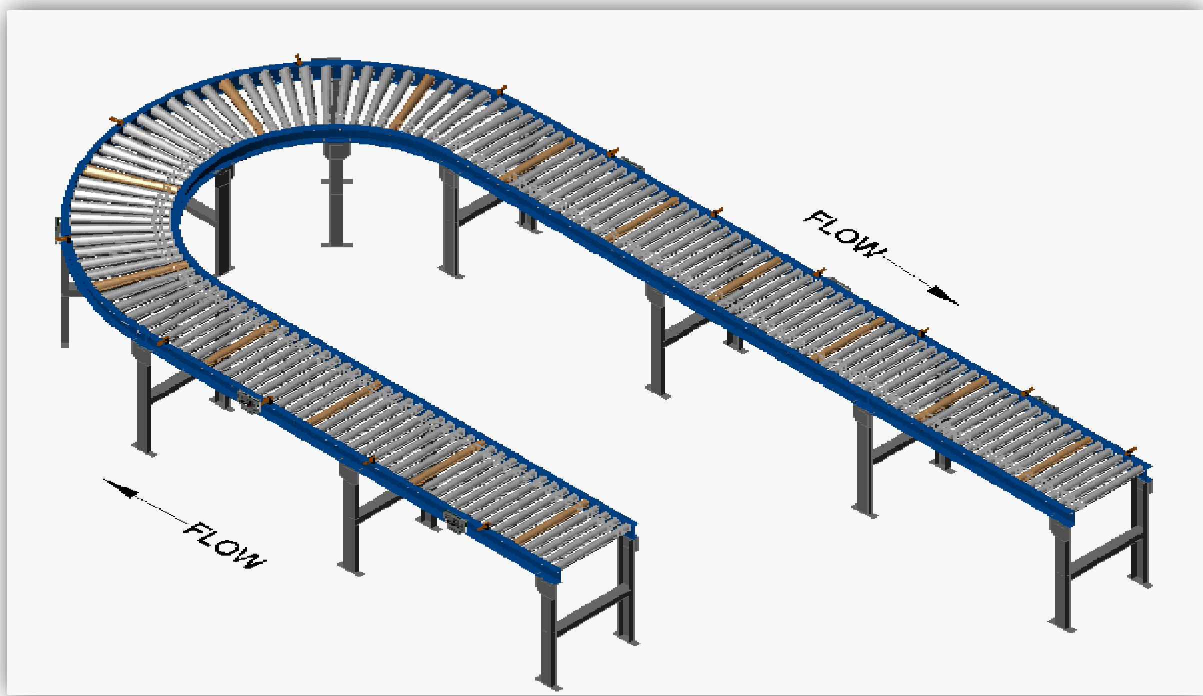


Figure 11 - Simple Linear Conveyor Example

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 section *EasyRoll Software Configuration Tool* on page 67 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, *INSTALL* button must be released within 2 seconds. If held for longer than 2 seconds; the procedure is cancelled.
4. Once *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.

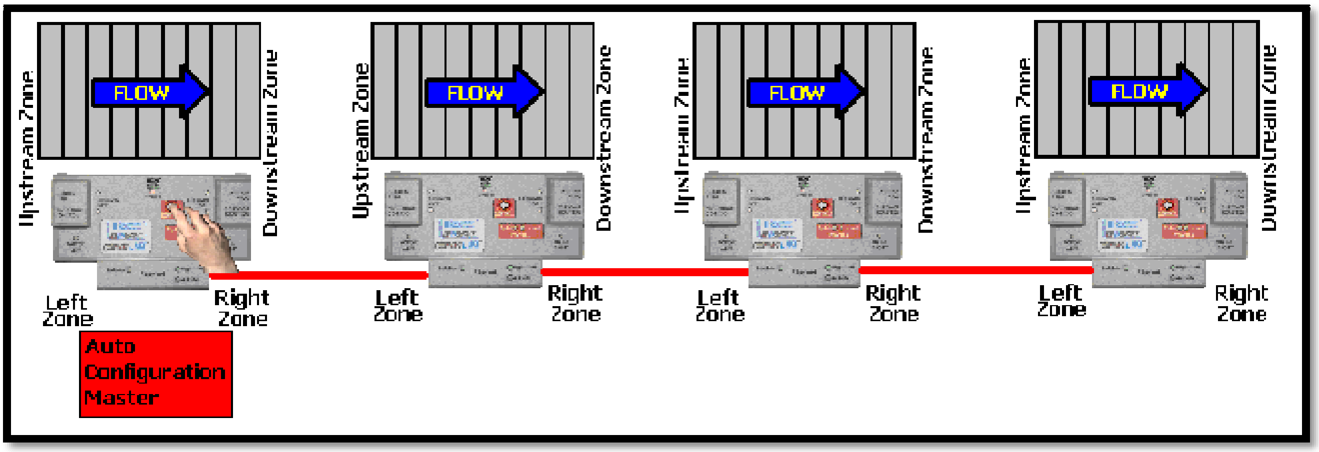


Figure 12 – Simple Auto Configuration Example

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.

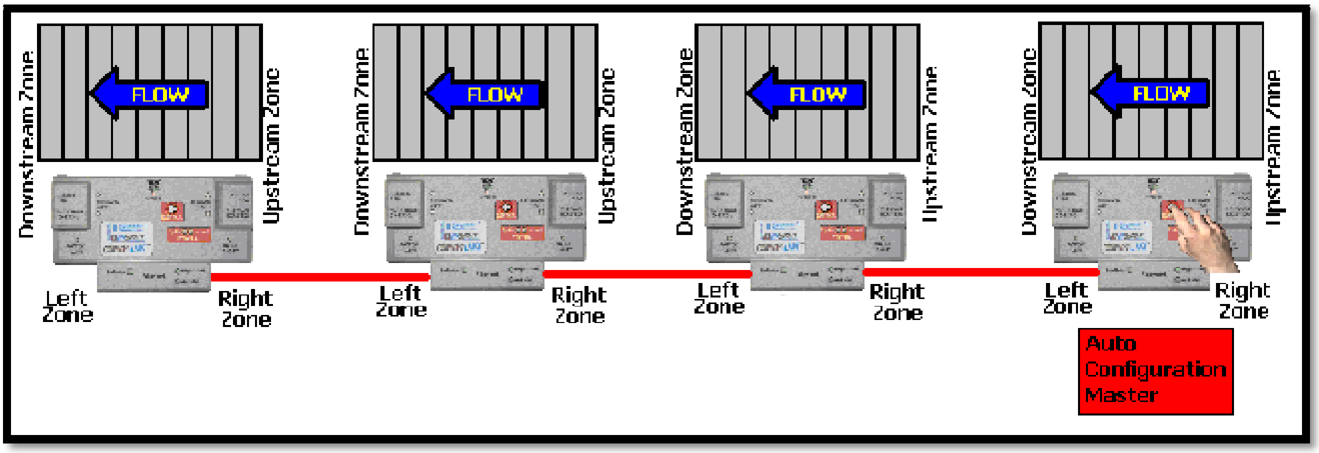


Figure 13 - Simple Auto Configuration Example in Opposite Direction

Please note that number of *ERSC* modules on a single network 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 can detect this and still correctly configure the conveyor flow. This is illustrated in the following figure:

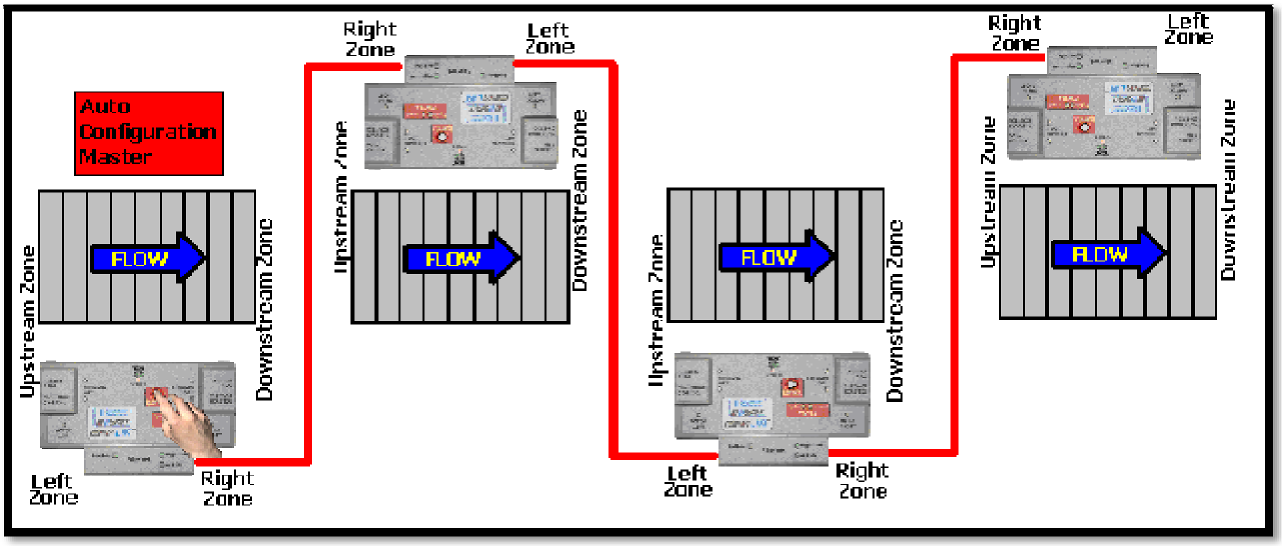


Figure 14 - Opposite Side Module Location Example

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 *Figure 2 - ERSC Module Hardware Features Identification* items 13 and 14) will blink on and off with green color.

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. • Check all networks, MDR, Sensor, and power connections and perform procedure again. • Verify that all connections are valid. Refer to section *Invalid Configuration Examples* on page 24. 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. • 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	Pulse / Kyowa 28 Watt model
MDR Speed	80% 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

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 67 for definitions of these settings and procedures for their modification.

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 43.

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 15 shows a typical example of singulation release.

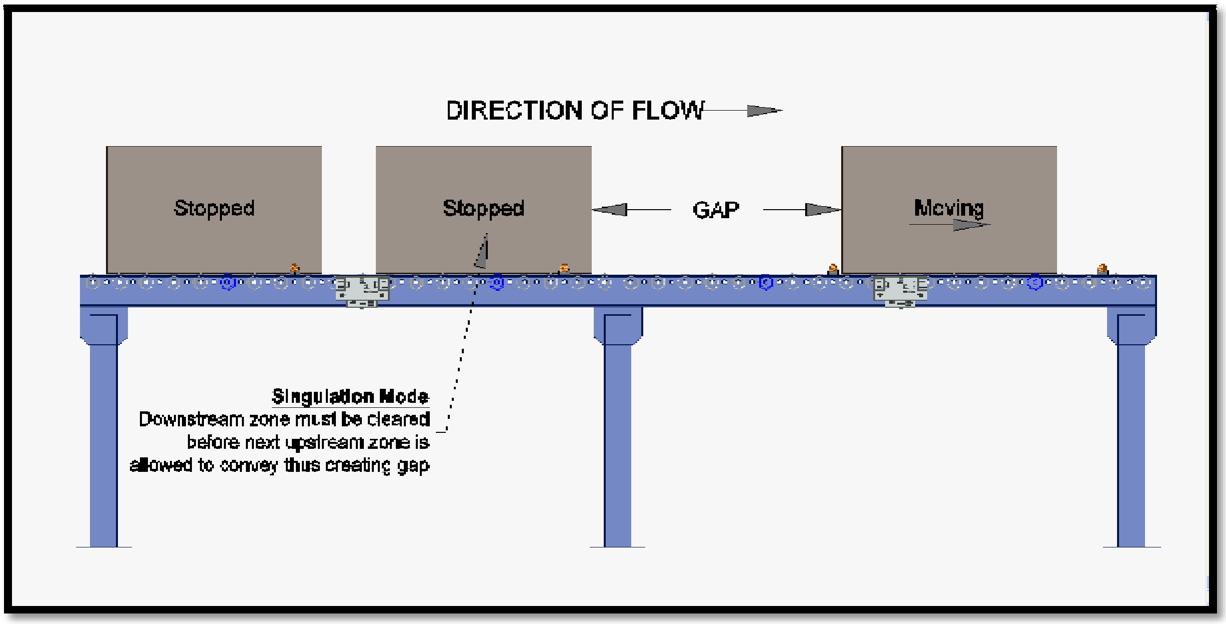


Figure 15 - Singulation Release Example

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.

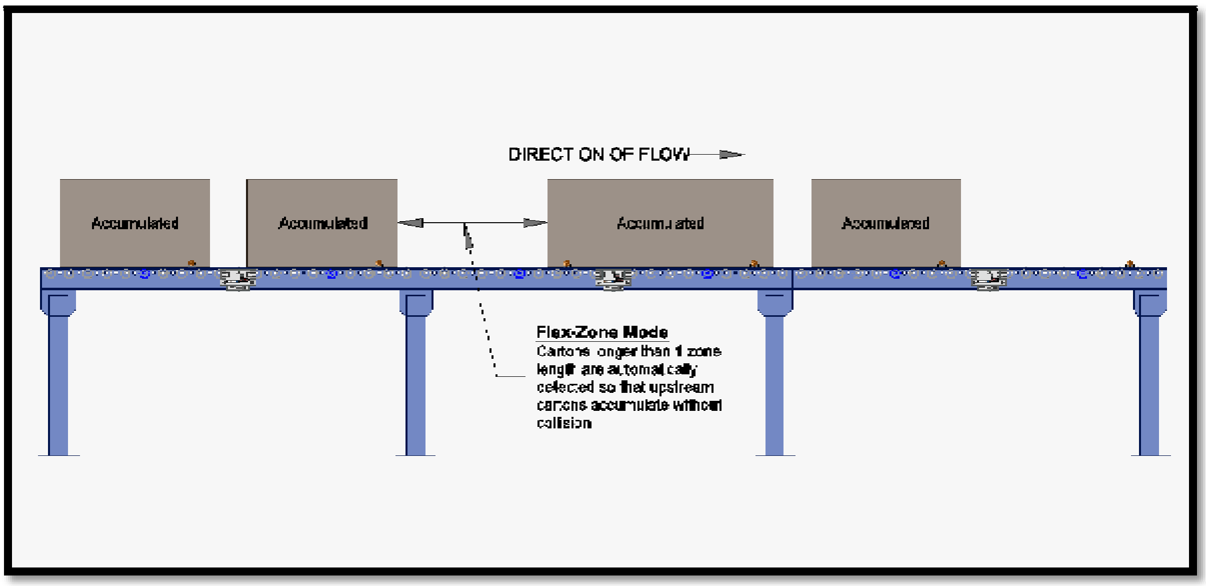


Figure 16 - Typical Flex Zone Mode Example

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.

Please refer to section *EasyRoll Software Configuration Tool* 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 30. 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.

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 section *EasyRoll Software Configuration Tool* for instructions on changing this value.

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 single *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 Your 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. Continue to hold *Install* button until *Status LED* begins to flash on and off RED, then release *INSTALL* button.
5. Wait until *ERSC* performs its internal boot-up procedures which will be indicated when the *Module* and *Network Status* LEDs both blink green.

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 Ports*) 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 17 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.

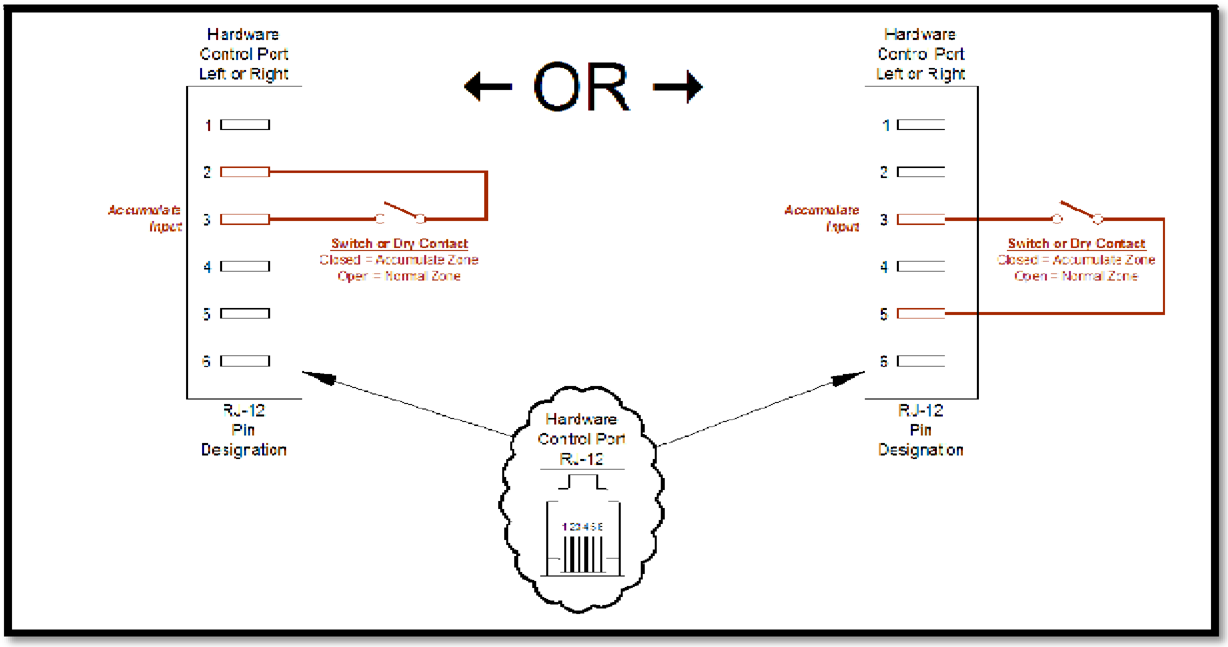


Figure 17 - Accumulate Control Connection Examples

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 17 are the default states.

Please refer to section *Hardware Connections Configuration* on page 104 for instructions on how to invert the expected *ERSC Accumulate Input* signal for your specific application.

Control Port's 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 18 and Figure 19 show the resulting *Control Port* functions based upon direction of conveyor flow after an *Auto-Configuration* procedure.

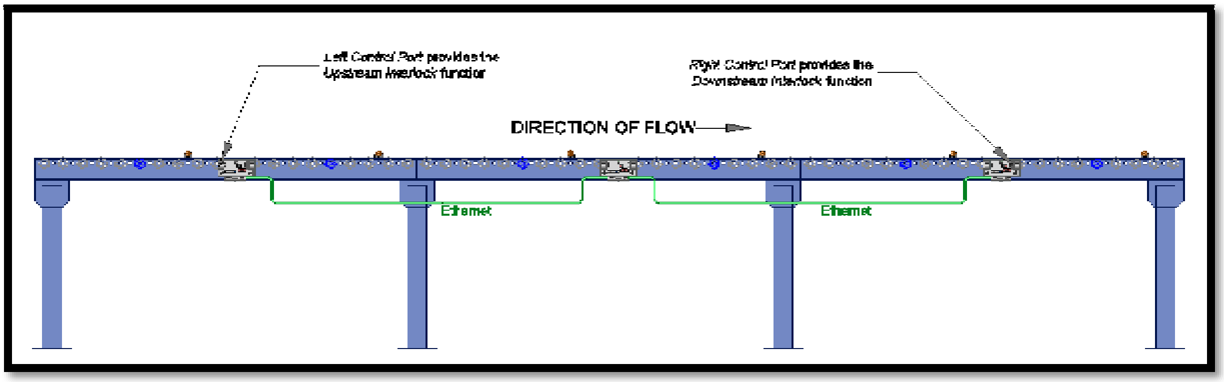


Figure 18 - Control Port assignment based upon flow example

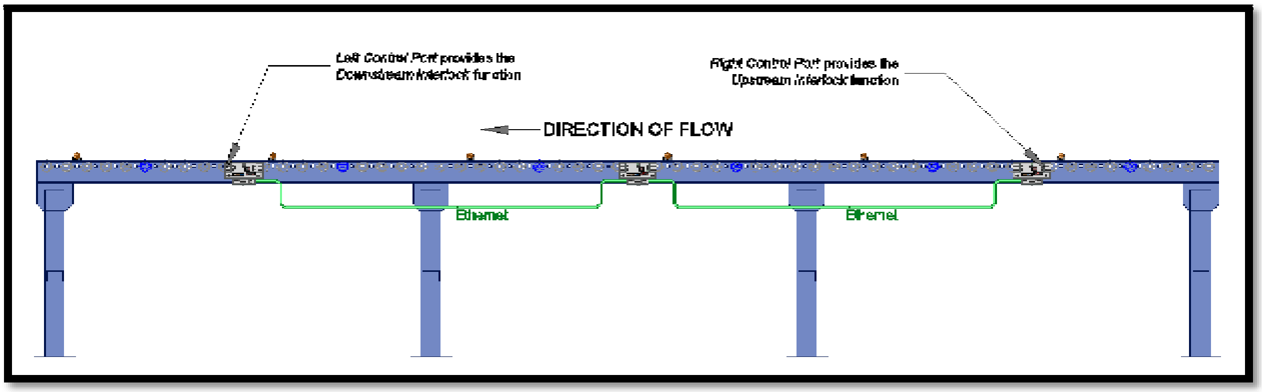


Figure 19 - Control Port assignment example based upon opposite flow direction

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 (refer to *ConveyLinx Ethernet Definition* on page 68). 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 20 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.

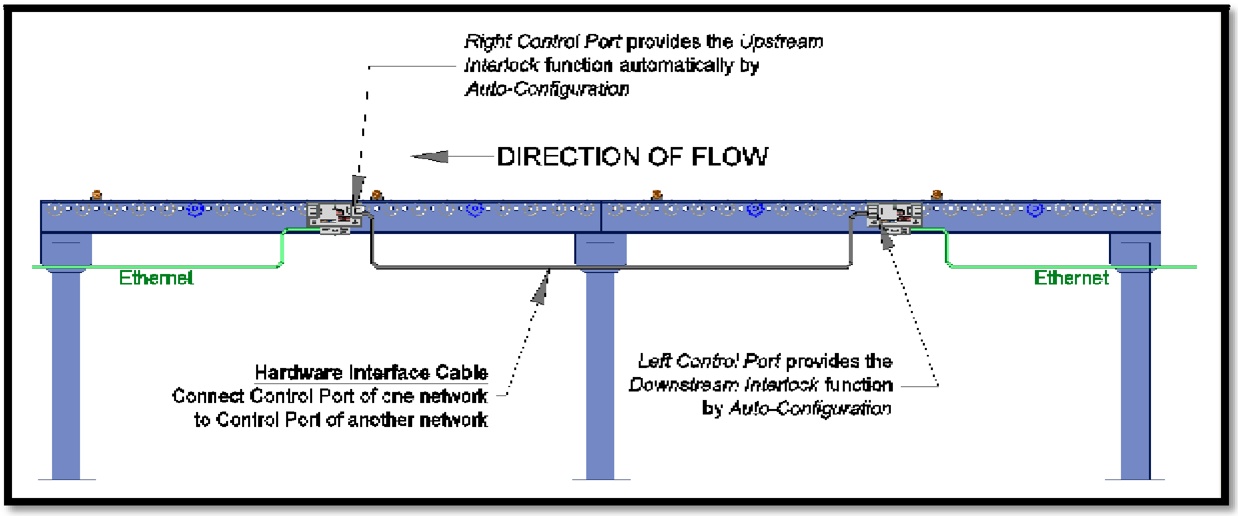


Figure 20 - Typical Hardware Interface Cable example

Figure 21 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*.

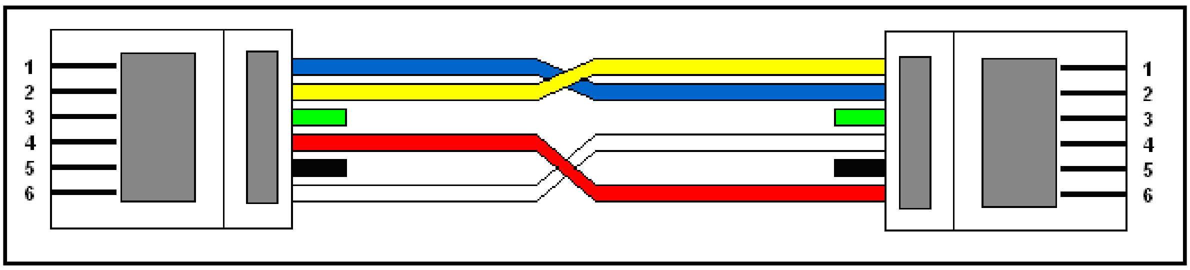


Figure 21 - Typical Module to Module Hardware Connection

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*.

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 22.

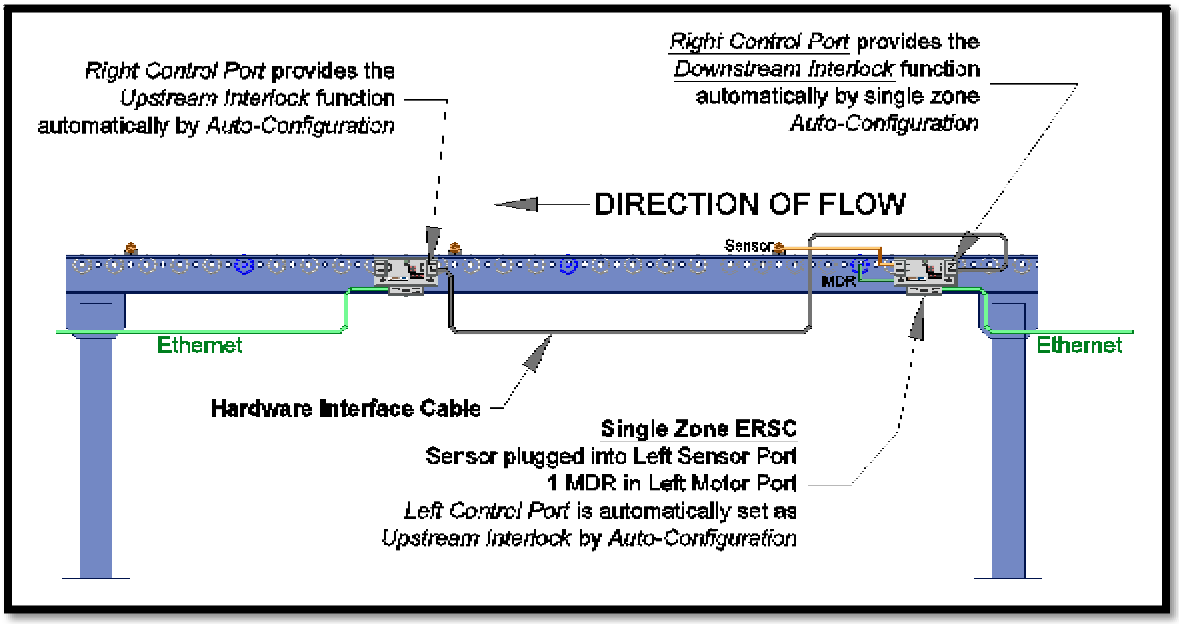


Figure 22 - Single zone hardware interface example

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

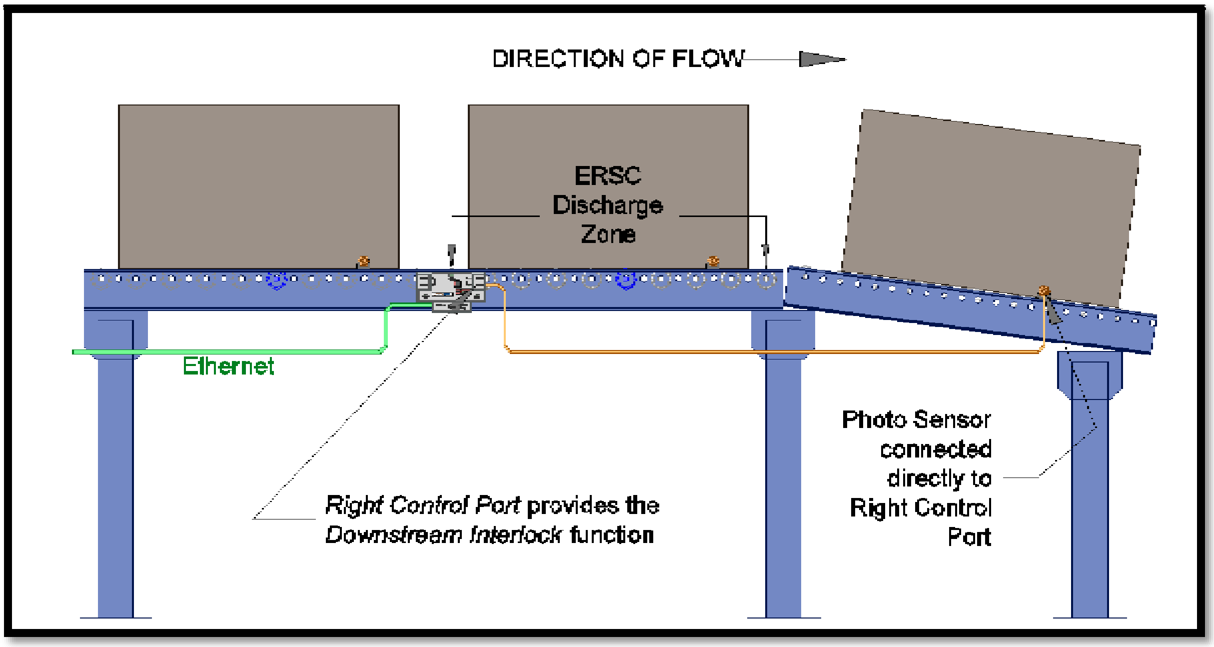


Figure 23 – Sensor in Downstream Interlock Control Port Example

Figure 23 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.

Upstream Sensor in Control Port

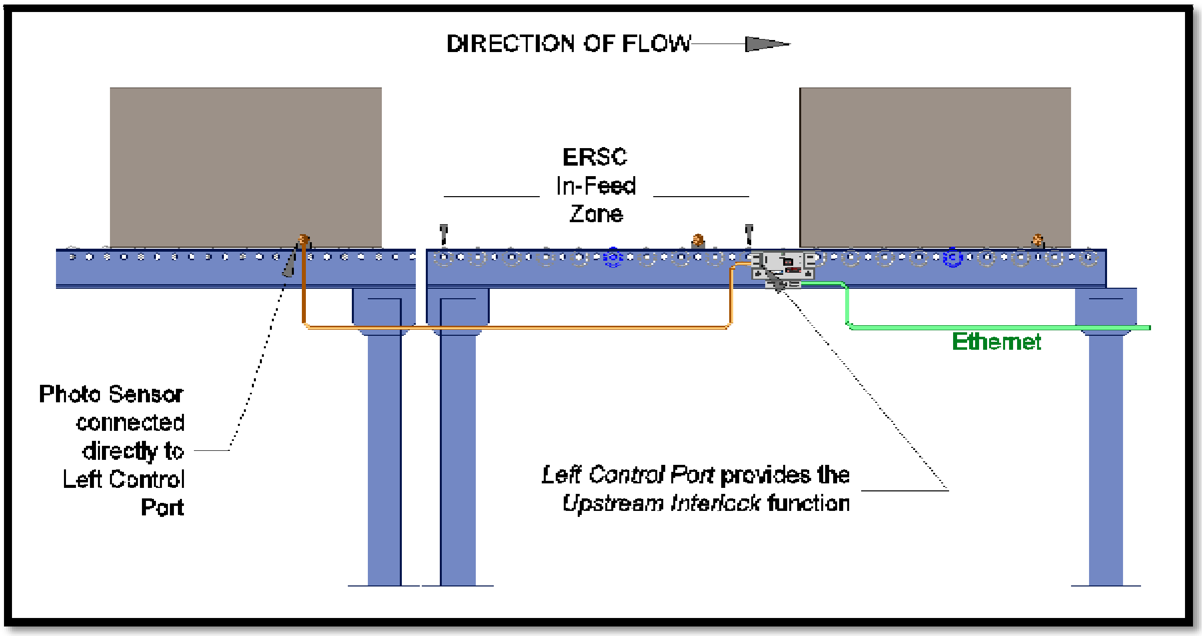


Figure 24 – Sensor in Upstream Interlock Control Port Example

Figure 24 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 *Hardware Connections Configuration* on page 104 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 Ports* are configured with the Upstream or Downstream Interlock functions still apply for photo-sensor connections to *Control Ports*.

Some photo sensors (particularly models that already include an RJ-11 / RJ-12 connector) utilize a separate “sensor health” 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 “sensor health” 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 44 . If such a photo sensor energizes its sensor health signal when sensor health is “OK”, 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 may 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 Pin 4 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.

Please refer to section *Electrical Connections for PLC Controls* beginning on page 58 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.

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 25.

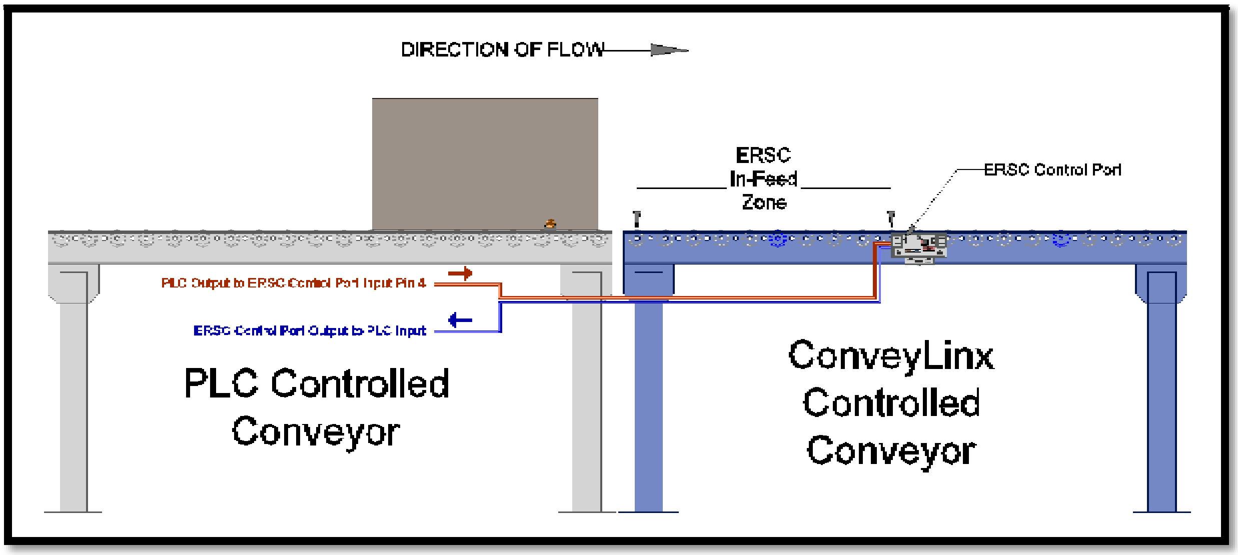


Figure 25 - Typical Upstream Conveyor Interlock Example

Figure 26 depicts timing chart for a typical *Upstream Interlock* exchange of signals over time. Following Figure 26 is a listing of descriptions of the events from the timing chart.

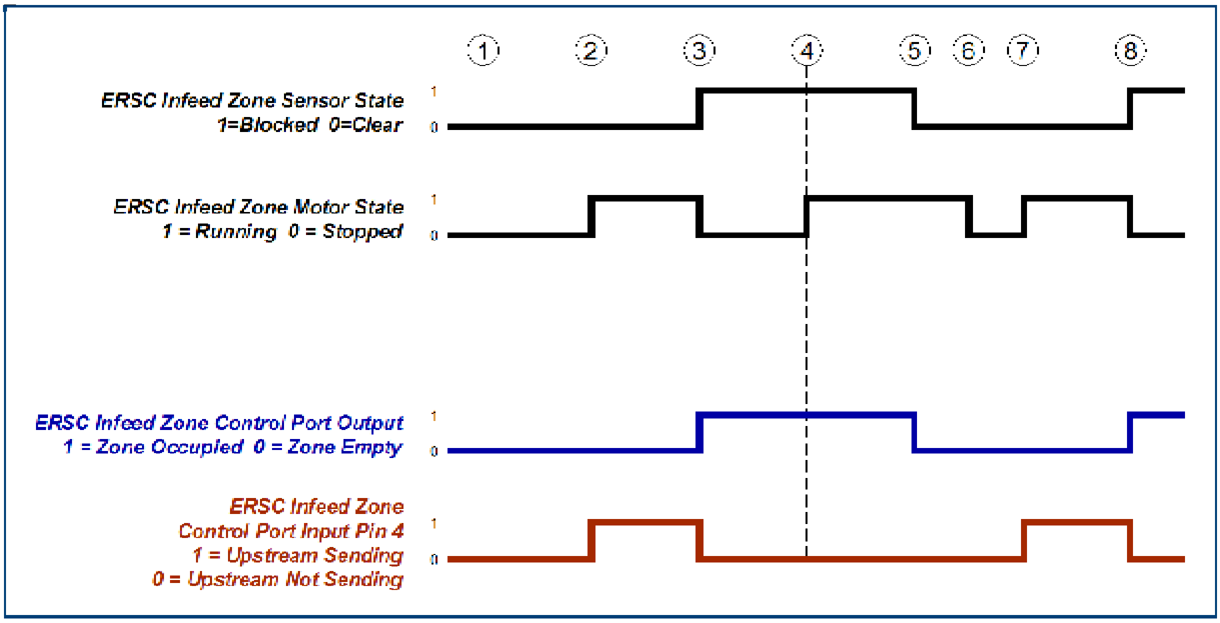


Figure 26 - Typical Upstream Interlock Timing Example

<u>Upstream Interlock Event Description</u>

- 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.

‚ 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

ƒ 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.

„ 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.

… 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.

† Motor's run after sensor clear timer has expired and in-feed zone's motor is stopped

‡ Repeat of ‚

ˆ Repeat of ƒ

The logical "1" and "0" states for the *ERSC Input* and *ERSC Output* signals show above in Figure 26 are the default states.

Please refer to section *Hardware Connections Configuration* on page 104 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.

This scenario is used when a PLC controlled conveyor needs to accept a load in a singulated fashion from the discharge zone of the most downstream *ConveyLinx* module as shown in Figure 27.

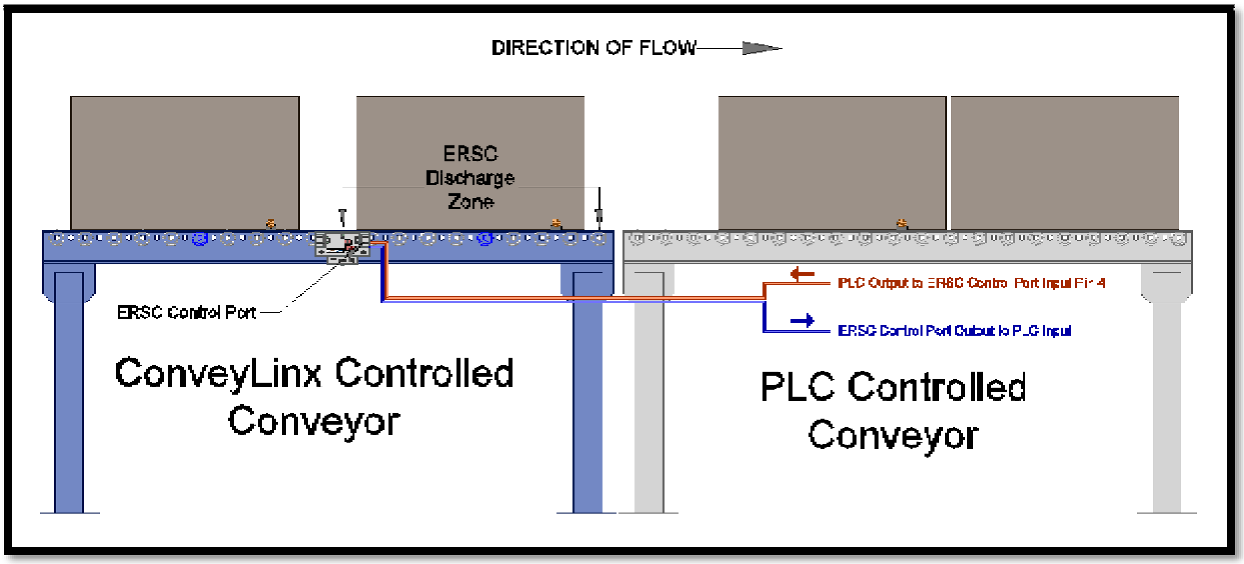


Figure 27 - Typical Downstream Conveyor Interlock Example

Figure 28 depicts timing chart for a typical *Upstream Interlock* exchange of signals over time. Following Figure 28 is a listing of descriptions of the events from the timing chart.

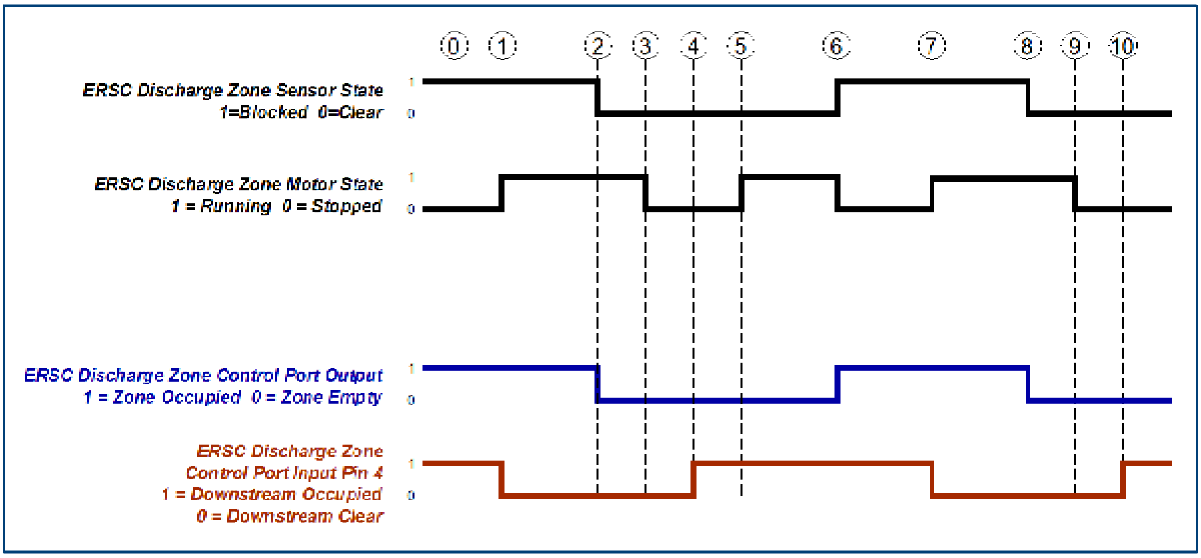


Figure 28 - Typical Downstream Interlock Timing Example

Downstream Interlock Event Description

€ 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.

• 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.

‚ 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.

ƒ *ERSC* discharge zone's Run After time has expired and the zone motor is stopped.

„ 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.

… 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.

† 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.

‡ Repeat of •

ˆ Repeat of ‚

‰ Repeat of ƒ

Š Repeat of „

Under normal operation, the time duration between steps ‚ and „ 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 39 for full description of the No Arrival Jam condition.

Please refer to section *Jam & Run After Timers* on page 89 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 28 are the default states.

Please refer to section *Hardware Connections Configuration* on page 104 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 36 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 29 shows a typical connection between a ConveyLinx *ERSC* module's *Control Port* and a 24VDC sinking type PLC Input card.

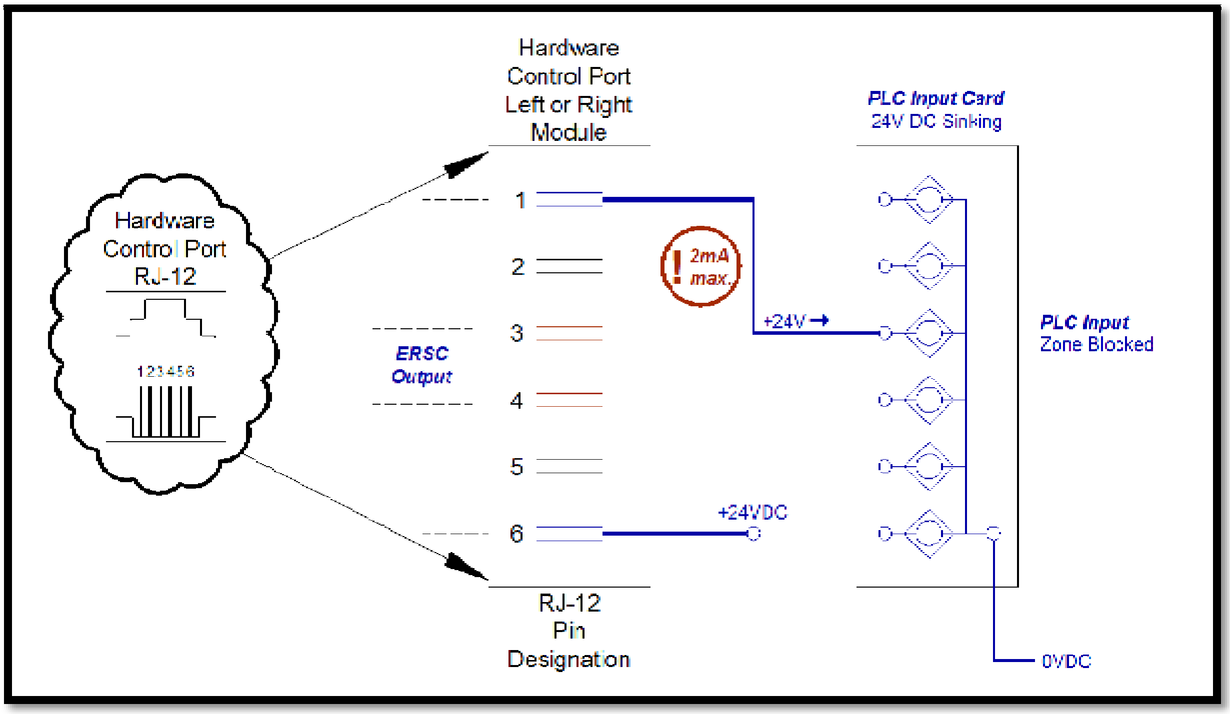


Figure 29 – Sinking PLC Input from ERSC Control Port Output

Sourcing PLC Input

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

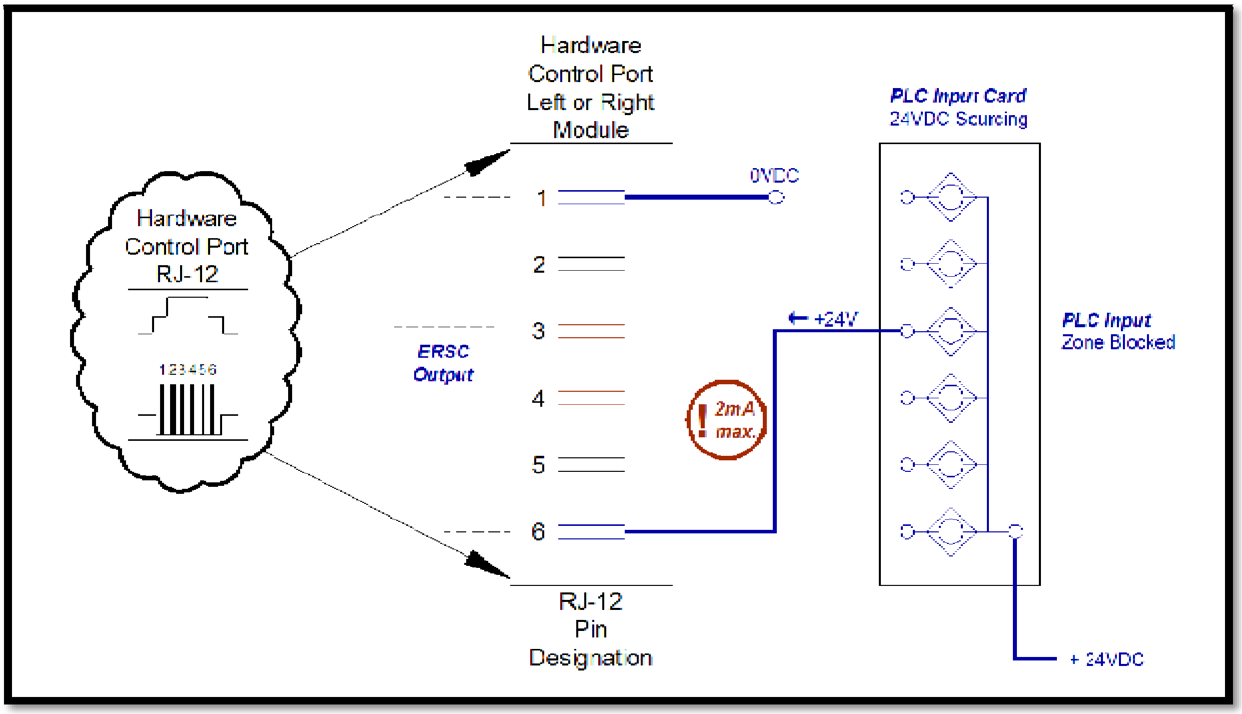


Figure 30 - Sourcing PLC Input from ERSC Control Port Output

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

Please refer to section *Using ERSC-SE2 Terminal Breakout Module* on page 64 for details on utilizing *ERSC*-SE2 breakout terminal board with amplifier 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*.

Sourcing PLC Output to ERSC Input

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

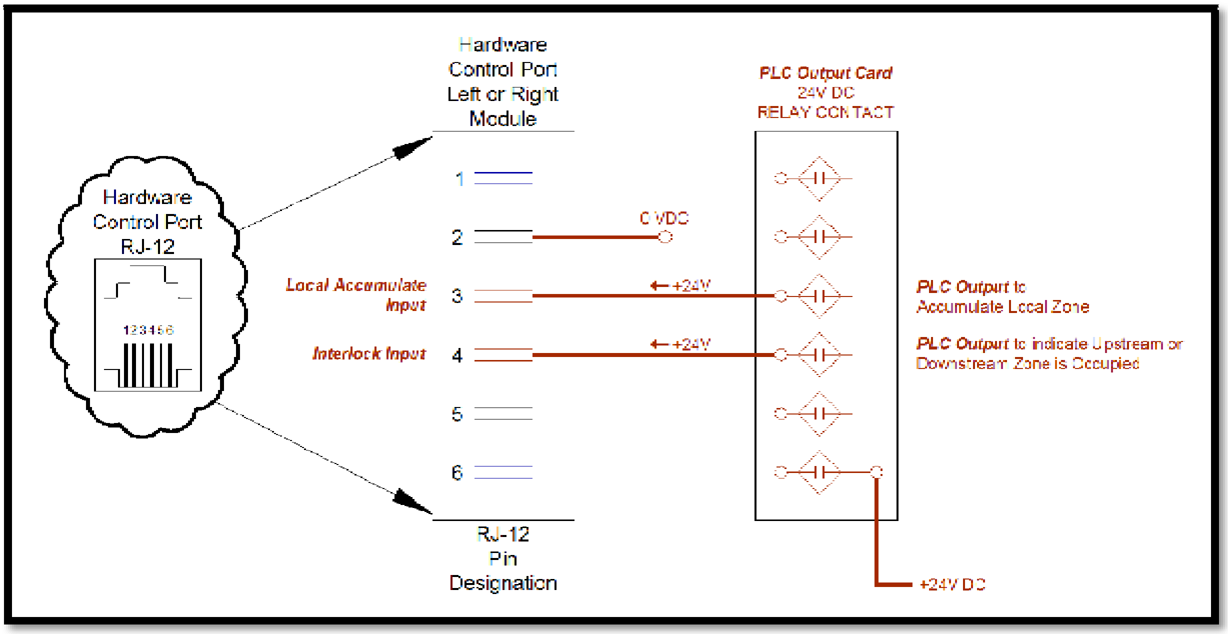


Figure 31 - Sourcing PLC Output to Sinking ERSC Control Port Input

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.

Sinking PLC Output to ERSC Input

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

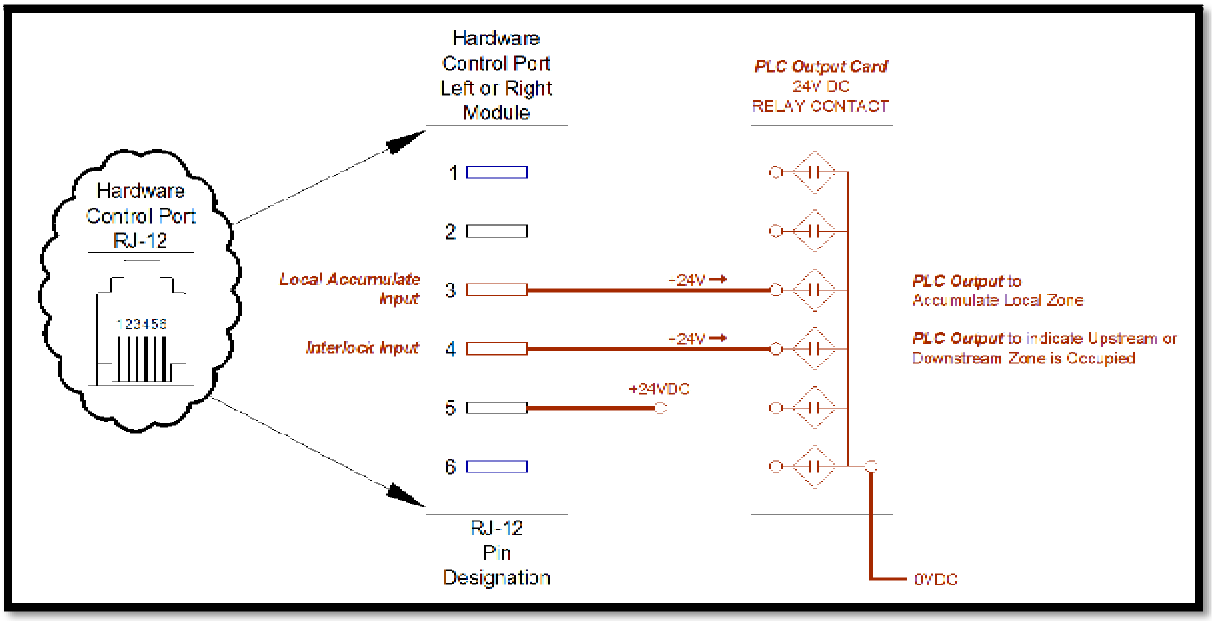


Figure 32 - Sinking PLC Relay Contact Output to Sinking ERSC Control Port Input

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 62 for details on using solid state PLC output modules for connections to *Control Ports*.

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 ERSC-SE2 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 33 and Figure 34 show the connection polarity of the blocking diode for sinking and sourcing solid state PLC output modules respectively.

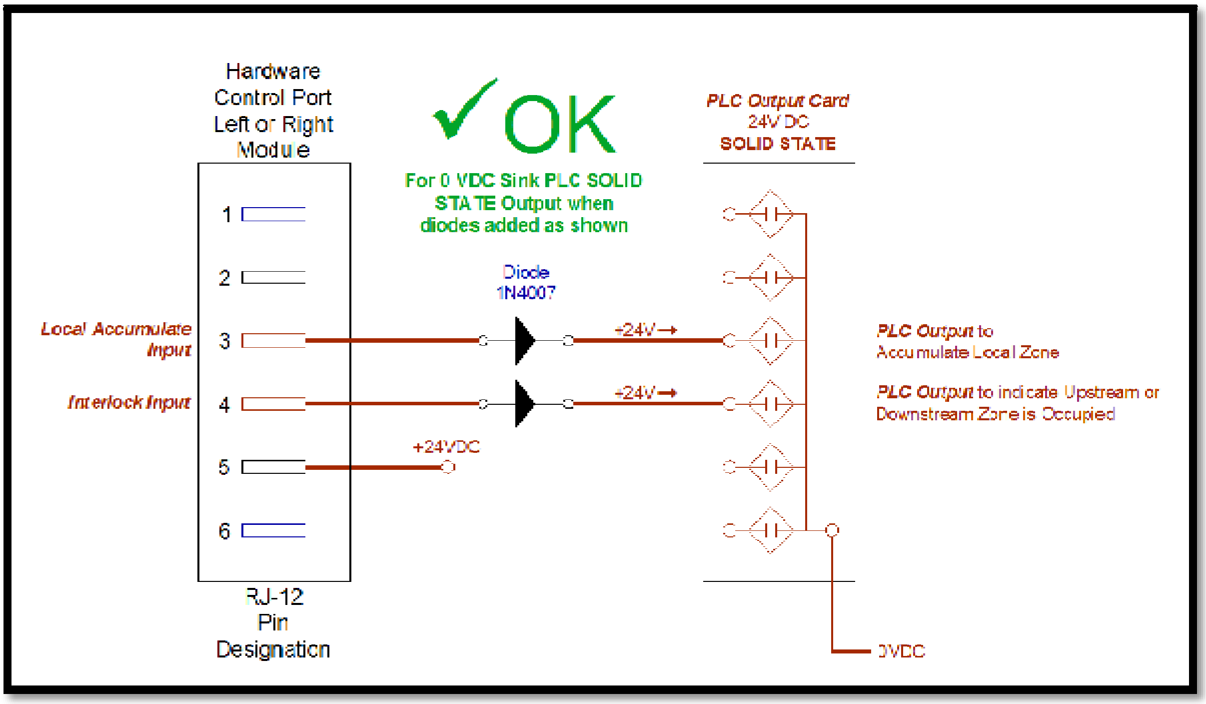


Figure 33 - Diode connection polarity for Solid State Sinking Output Module

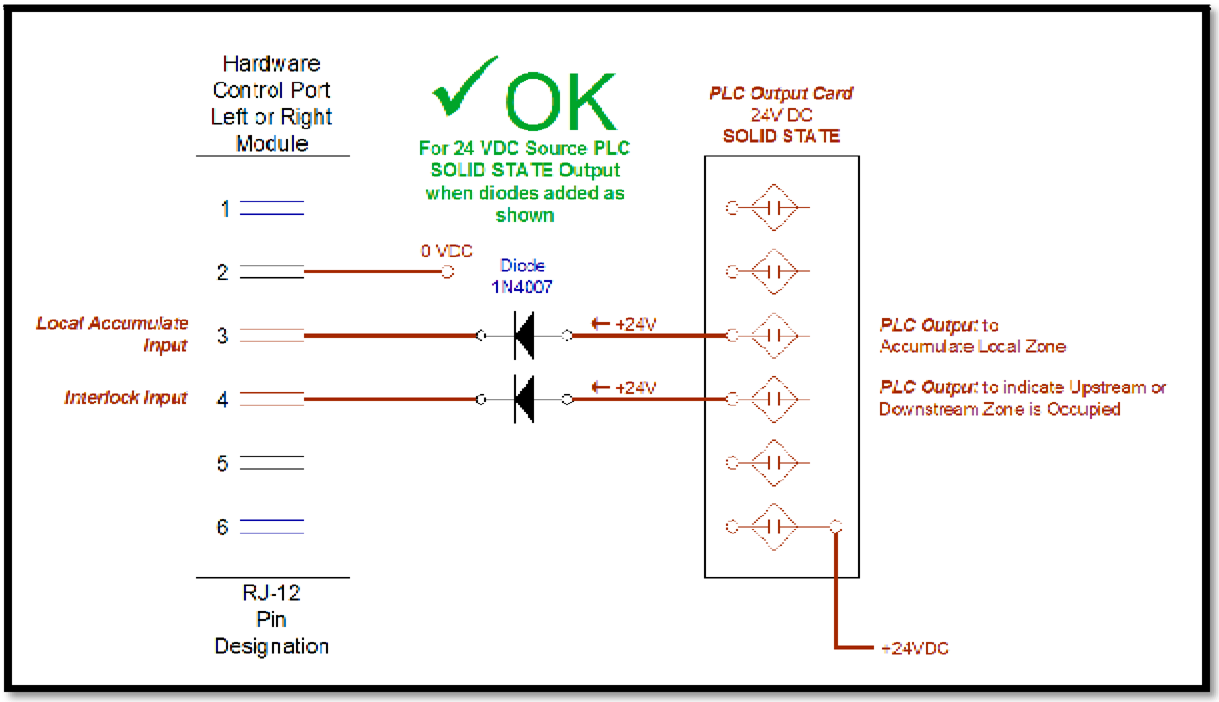


Figure 34 - Diode connection polarity for Solid State Sourcing Output Module

Using ERSC-SE2 Terminal Breakout Module

Insight Automation part number ERSC-SE2 is a small module that provides a simple 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-SE2 also provides blocking diodes for both the Local Zone Accumulate input signal (Pin 3) and the Interlock input signal (Pin 4). These diodes are equipped with user settable jumpers to allow configurations for both sourcing and sinking solid state PLC output modules. The ERSC-SE2 also includes an amplifier for the *ERSC* output circuit (Pin 1 and Pin 6) to allow up to 200mA 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. Figure 35 shows a typical ERSC-SE2 cable connection.

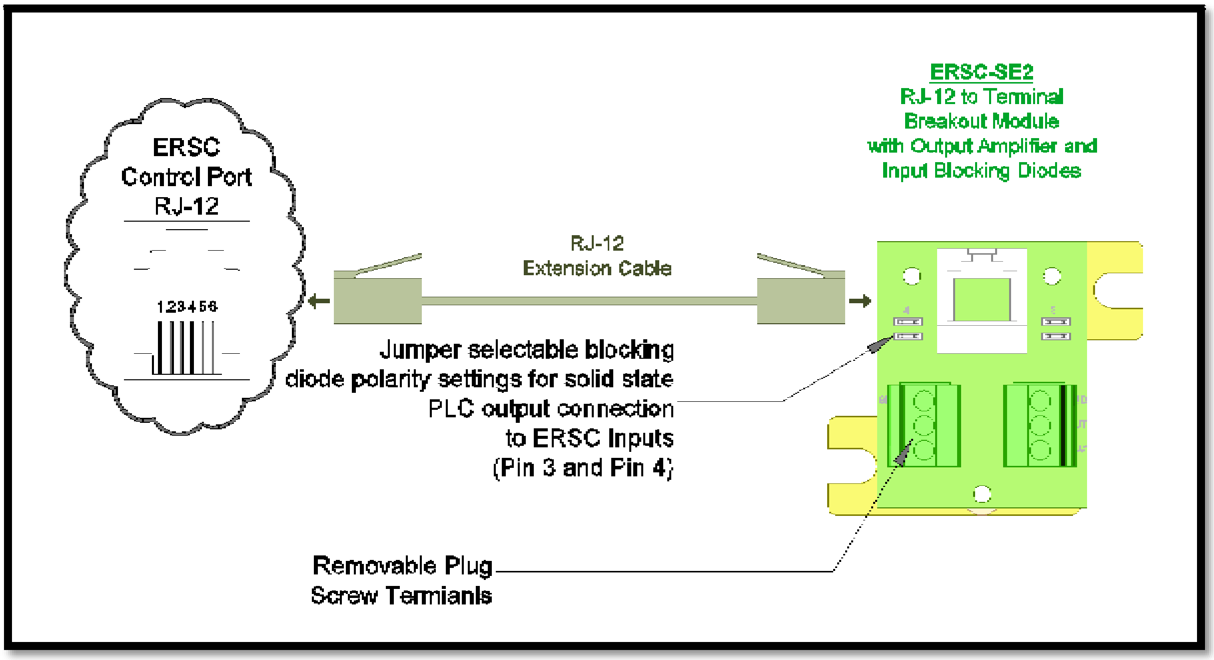


Figure 35 - ERSC-SE2 Example

Figure 36 shows the typical connection for a device to the *ERSC*'s *Control Port* output circuit. Please note that the circuit is limited to 200mA current.

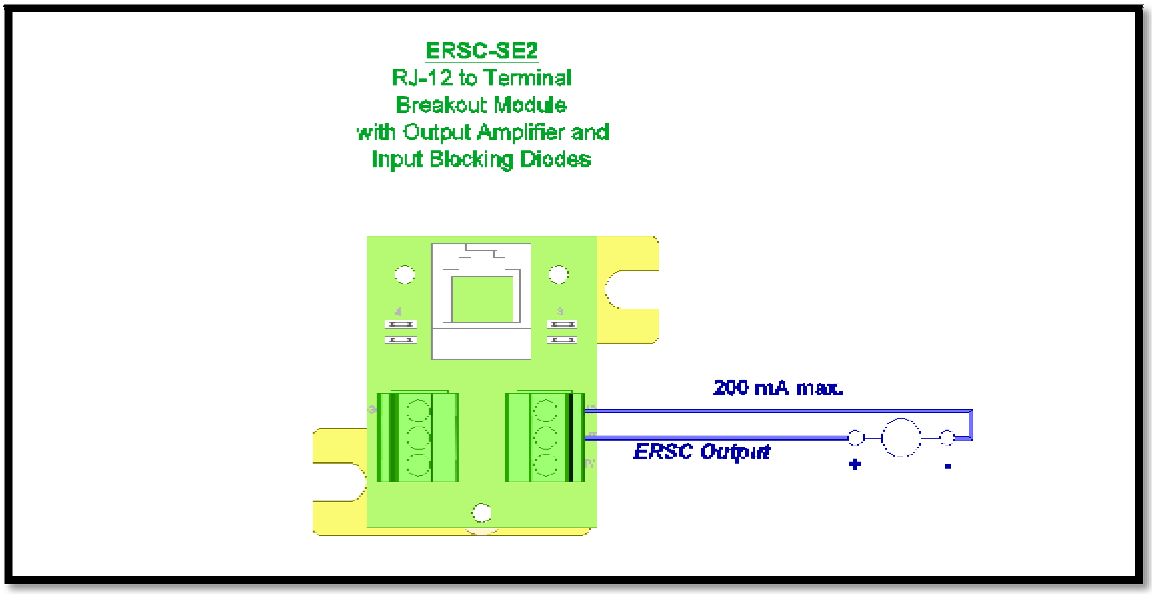


Figure 36 - Typical ERSC Output connection example

ERSC output circuit from ERSC-SE2 provides a +24V PNP (source) connection only. When the *ERSC* logically energizes the output; the "OUT" terminal provides +24V.

Figure 37 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 34.

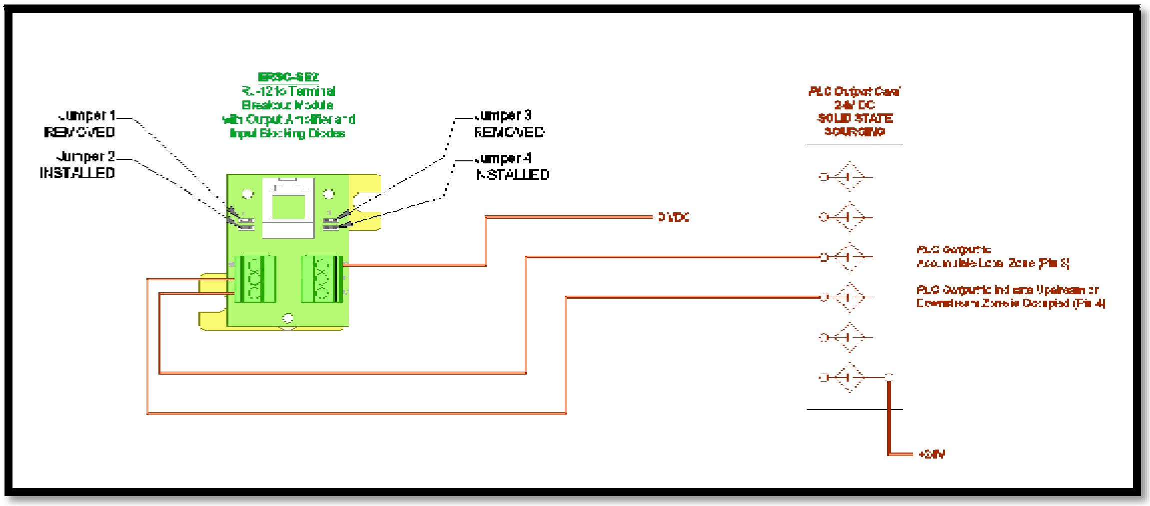


Figure 37 - Typical PLC Sourcing Output connection to ERSC Inputs

Figure 38 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 33.

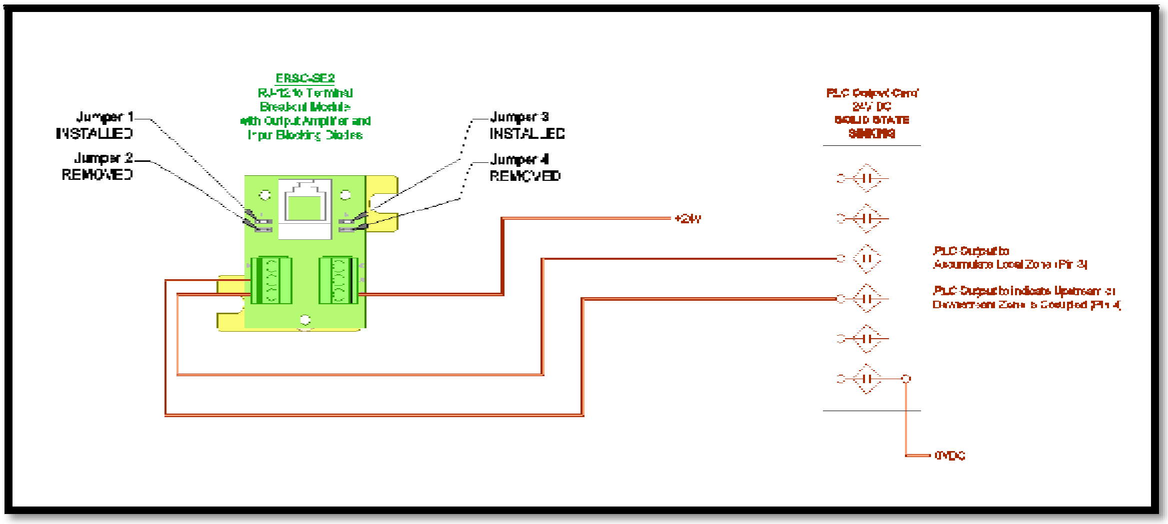


Figure 38 - Typical PLC Sinking Output connection to ERSC Inputs

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 clear time values
- *Look Ahead* slow down feature enable and 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.

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.
- *Slave* mode selection to allow an *ERSC* to suspend its ZPA function and be logically connected to an adjacent *ERSC* for motor run command.
- *PLC* mode selection to allow an *ERSC* to suspend its *ZPA* function and be logically controlled from an external PLC.

Installing EasyRoll tool on your PC

The files for EasyRoll will be typically sent or distributed 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 *C:* drive under the *Program Files* folder.

ConveyLinx Ethernet Definition

Please refer to *Appendix B – Configuring Your 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.

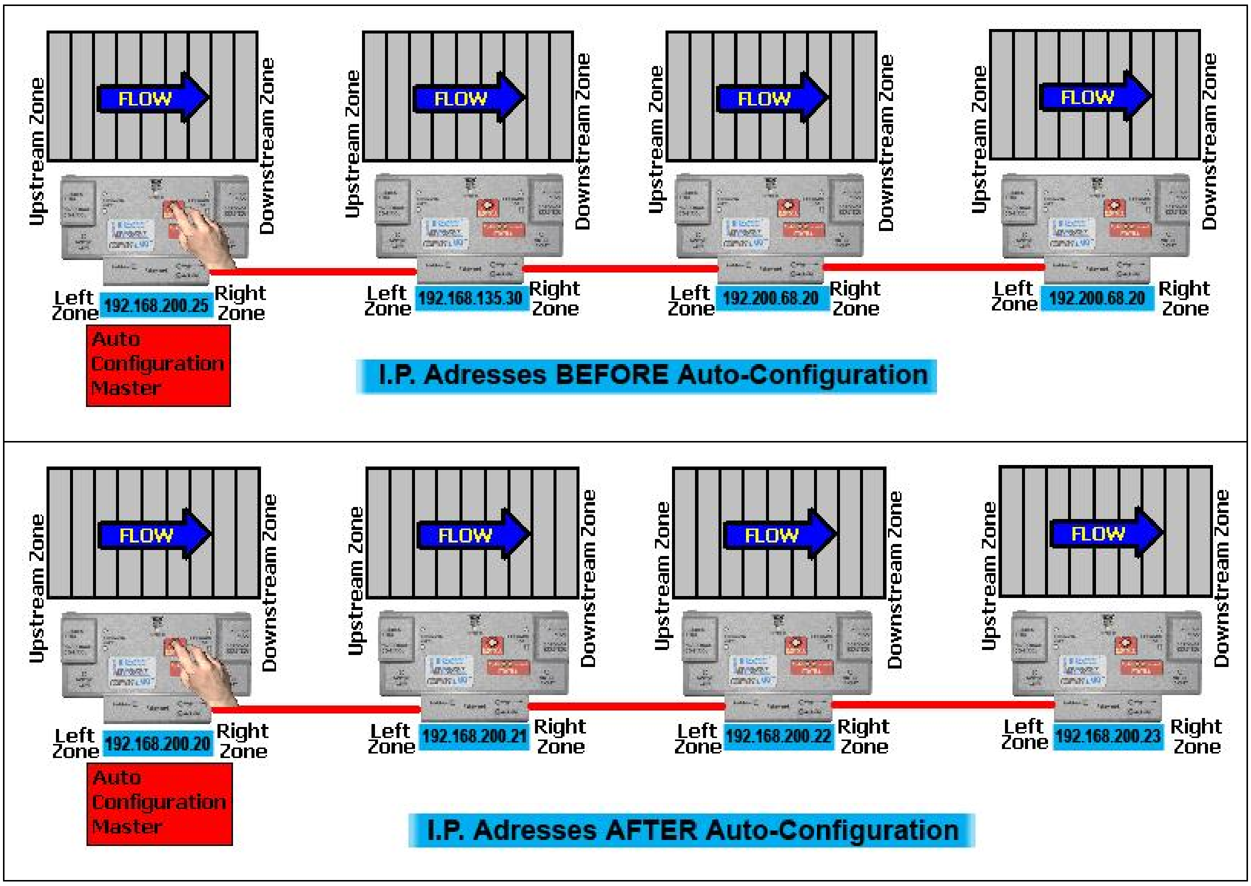
For the purposes of *ConveyLinx;* the `AAA.BBB.CCC` portion of the I.P. address taken together is defined as the ***Subnet***. The `DDD` value of the address is defined as the ***Node***.

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; connect your PC's Ethernet port to the *Auto-Configuration Master* as shown below in Figure 39

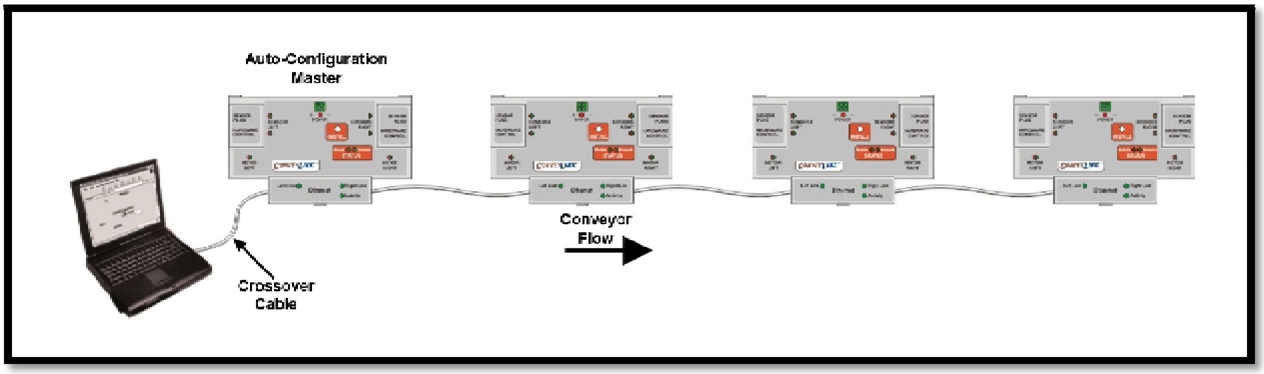


Figure 39 - Initial PC Connection to ConveyLinx Subnet

It is highly recommended to connect the PC directly to the ConveyLinx network. Avoid trying to connect via Ethernet switches or wireless router/switches

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

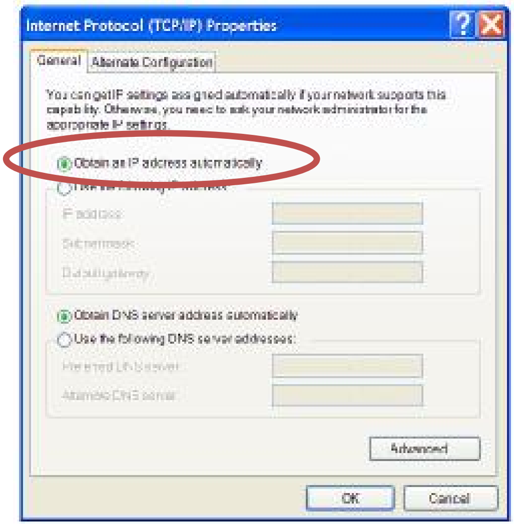
Any of these choices is equally valid and totally dependent on user preference.

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 Your PC for Ethernet Subnets* on page 113 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 39 - 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 *ConveyLinx Subnets* from a single PC with *EasyRoll*.

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

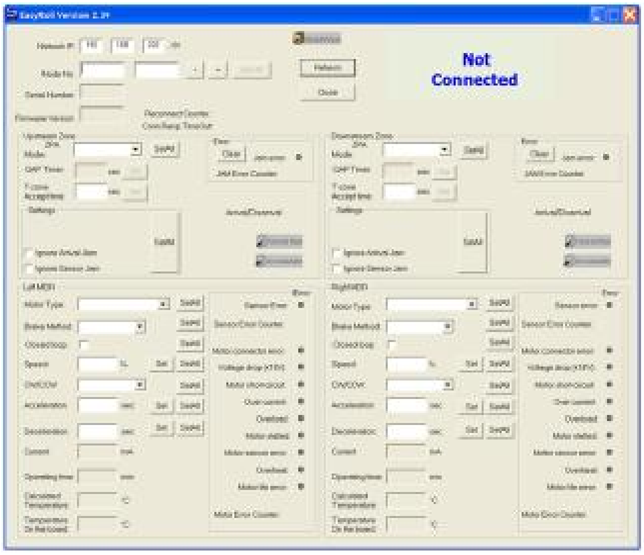
Regardless of which manual procedure you choose, with your PC and *EasyRoll* you can easily accomplish either.

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

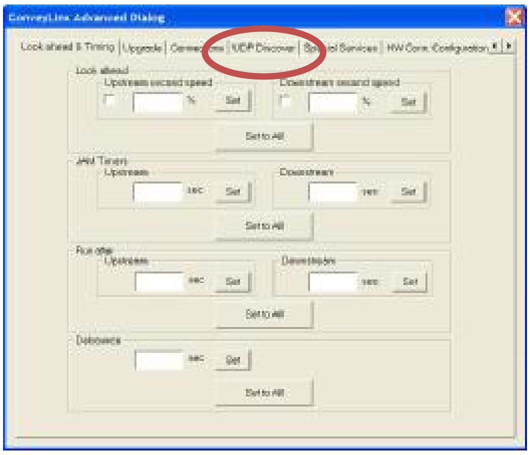
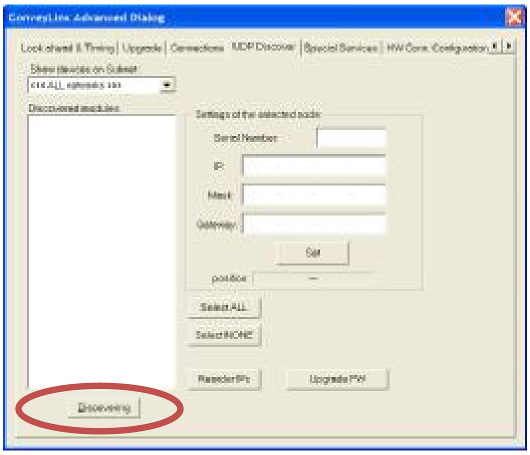
If you followed the default installation setting when you installed EasyRoll; the program should be selected from "Start – All Programs – Industrial Software – EasyRoll". If you selected a different location when you installed; go to that location and run "EasyRoll.exe".

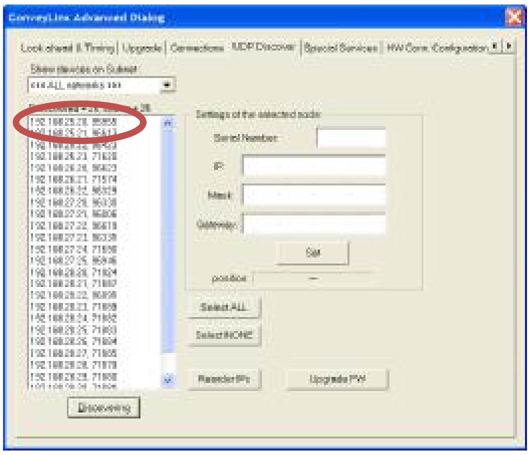
When you first run *EasyRoll*; you should see a window similar to this with greyed out status values and blank parameter boxes	

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 **[SHIFT] [CTRL] U.**

When you press **[SHIFT] [CTRL] U**, *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 *UDP Discover.*	
After clicking the *UDP Discover* 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. From this screen, click the "Discovering" button	

After clicking the "Discovering" button, *EasyRoll* will query the network and return a list of all *ERSC* modules it finds and show each module's I.P. address and serial number. 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 and its serial number is 71544	

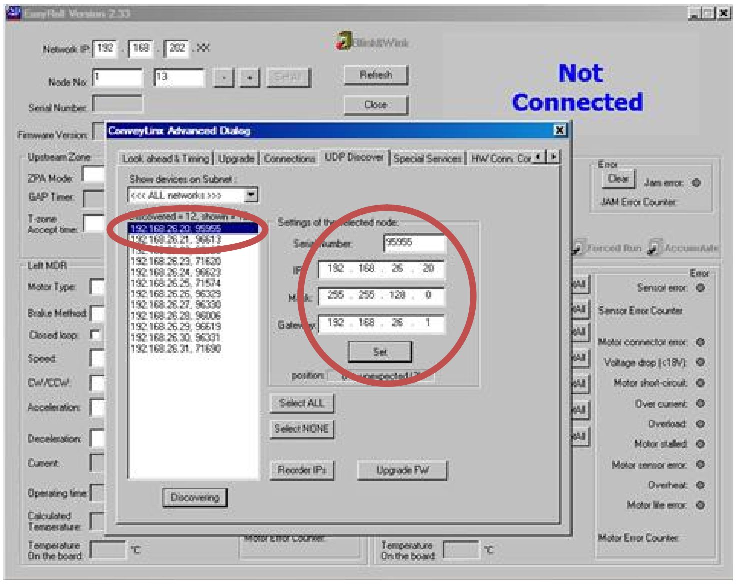
Please refer to section *ConveyLinx Advanced Dialog* on page 87 for further descriptions for the remaining *ConveyLinx Advanced Dialog* screen selection tabs.

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 Your 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 *UDP Discover* 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 40 - EasyRoll Main Screen* shows a typical main screen.

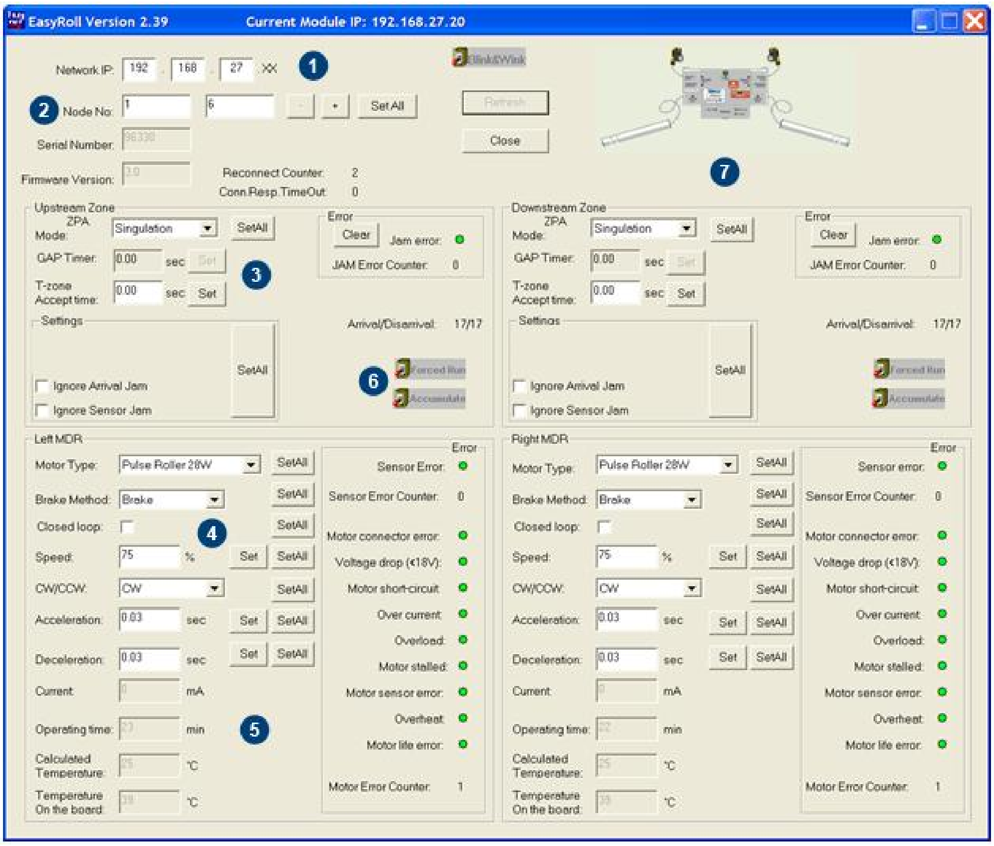


Figure 40 - EasyRoll Main Screen

The numbered items in *Figure 40 - EasyRoll Main Screen* show the basic functional areas and detailed descriptions will follow for each.

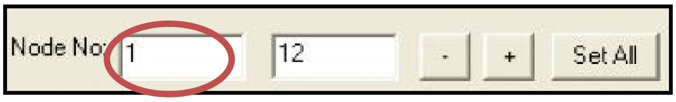
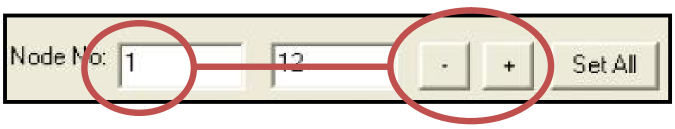
1. Network IP – This is where you enter the *Subnet* of the particular *ConveyLinx* network you wish to connect.
2. Node No. – This is where you enter a range of *Nodes* in which to connect. Entering values here will cause the "Refresh" button to enable. Clicking this button will cause the rest of the 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.	
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.	
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.	

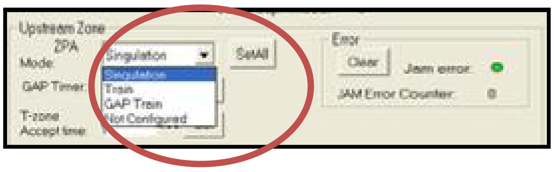
Node Identification

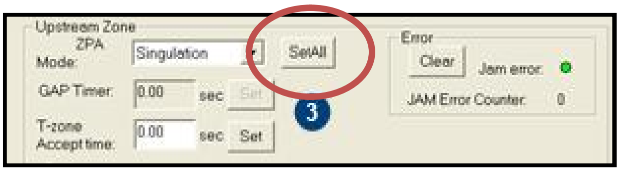
EasyRoll main screen has a feature identified as “Blink & Wink” that allows you to visually verify the *Node* you have selected.

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.	

Selecting a new setting from the "ZPA Mode" drop down box immediately changes the zone's mode. If you want to set all Upstream zones for the range of nodes entered in the "Node No." text boxes, then click the "Set All" buttons. Similarly, you can do the same operation in the "Downstream Zone" portion of the main screen.	

ZPA Mode Selections

Singulation mode is the default configuration for all zones upon the completion of the *Auto Configuration Procedure*. Please refer to section *Default Singulation Release ZPA Mode* on page 36 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 41 illustrates a typical Train Release example.

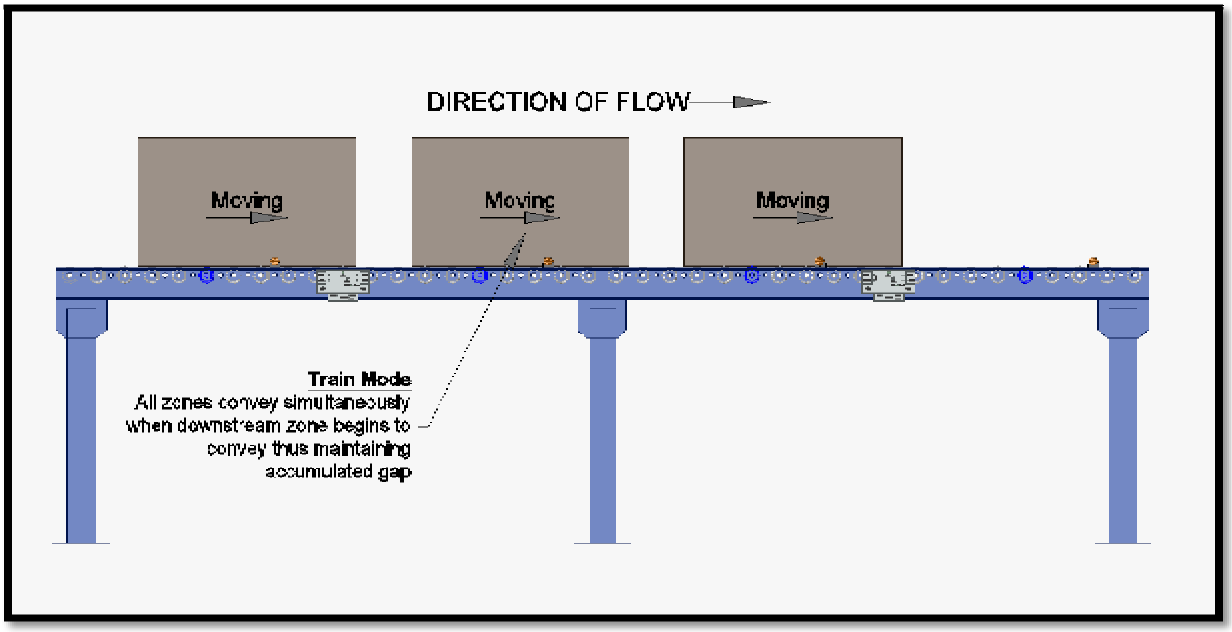


Figure 41 - Train Release Example

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 42 shows the kind of *T-Bone* arrangement that is available within *ConveyLinx* without any external control interface.

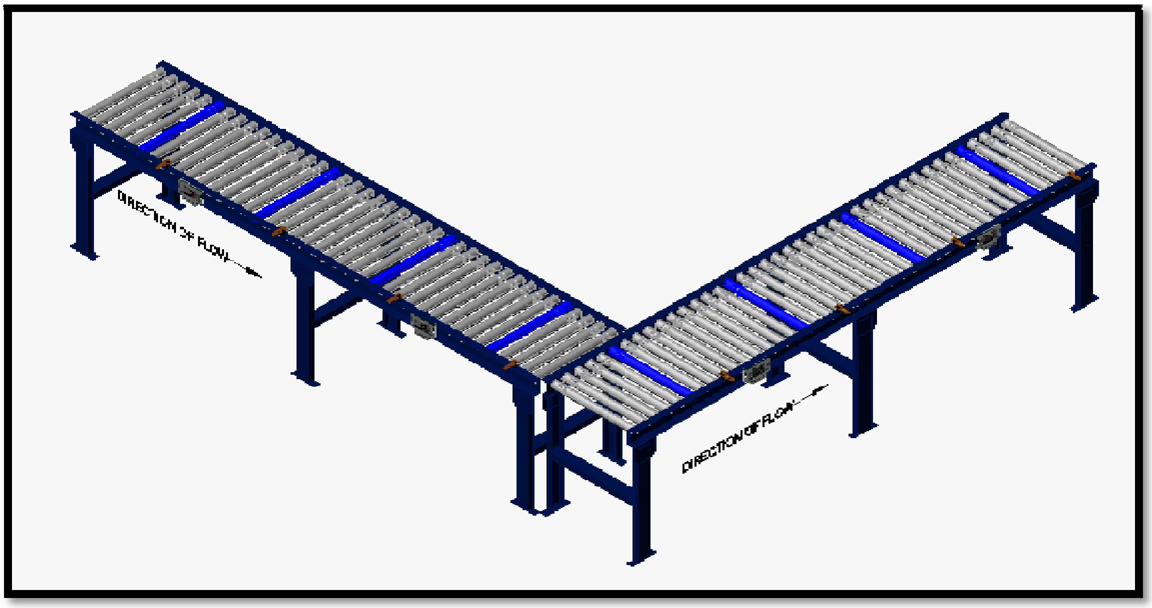


Figure 42 - Typical T-Zone Configuration

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 43 and Figure 44 depict two ways to connect the MDR's and photo-sensors to *ERSC* modules to result in a valid T-Bone configuration.

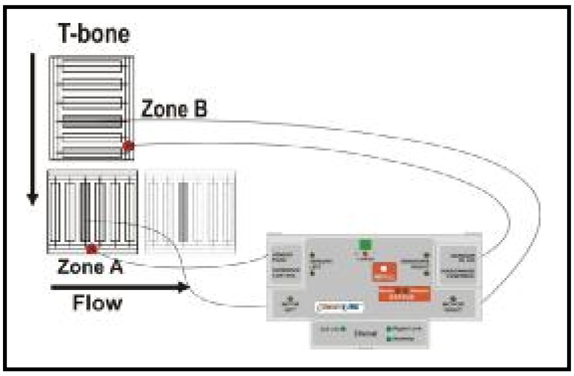


Figure 43 - Single ERSC T-Bone Example

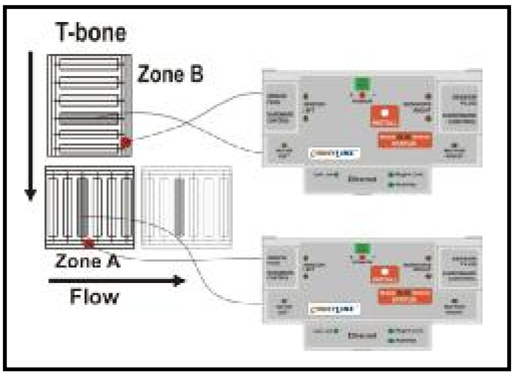


Figure 44 - Two ERSC T-Bone Example

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 39. 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 it's 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.

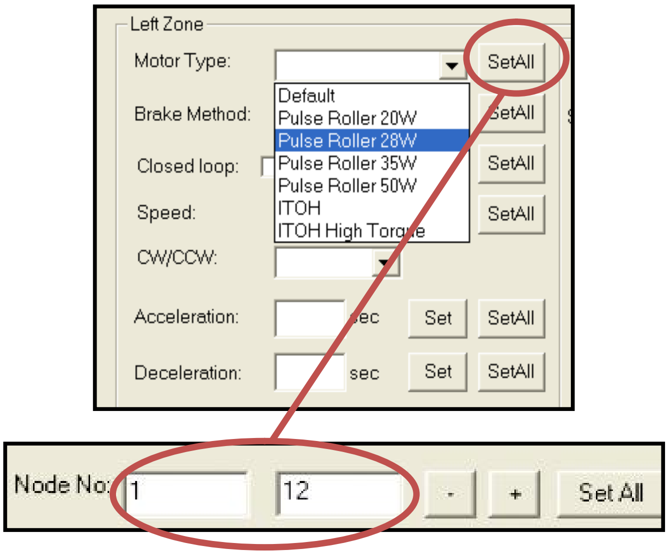
Similarly for the Arrival Jam, if a load is in transit from upstream to downstream, the logic expects the load to arrive downstream within the time dictated by the Jam Timer setting. If it does not arrive within this time window, there is an Arrival Jam. After the Arrival Jam is detected, by default, 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

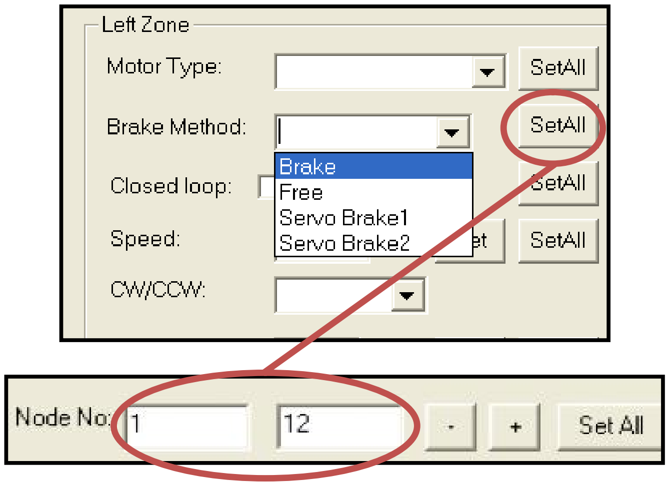
The "Motor Type" pull-down box lists all motor brand and types whose profiles are available for *ERSC*. Pulse Roller 28W is the default setting upon completion of the *Auto-Configuration Procedure*. The new settings are downloaded to the selected *Node* upon selecting a new item from the list. Clicking "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 you 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
Brake	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

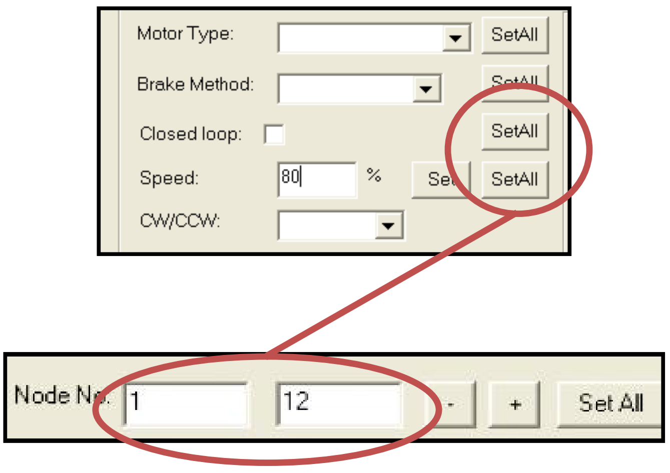
The *Speed* setting value is in % of the selected *Motor Type*'s rated **P**ulse **W**idth **M**odulation (PWM) current. The MDR's speed is directly proportional to the PWM current being fed to it. The default setting is 80% which means that the *ERSC* power circuit delivers 80% of the rated PWM current 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.

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 25 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 72. 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 following keyboard keys: **[SHIFT][CTRL] U**

Whatever *Node* is entered in the first box when you press **[SHIFT][CTRL] U** will be the particular *ERSC Node* data in context for the *ConveyLinx Advanced Dialog* tab selections when the dialog screen pops up.	

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.

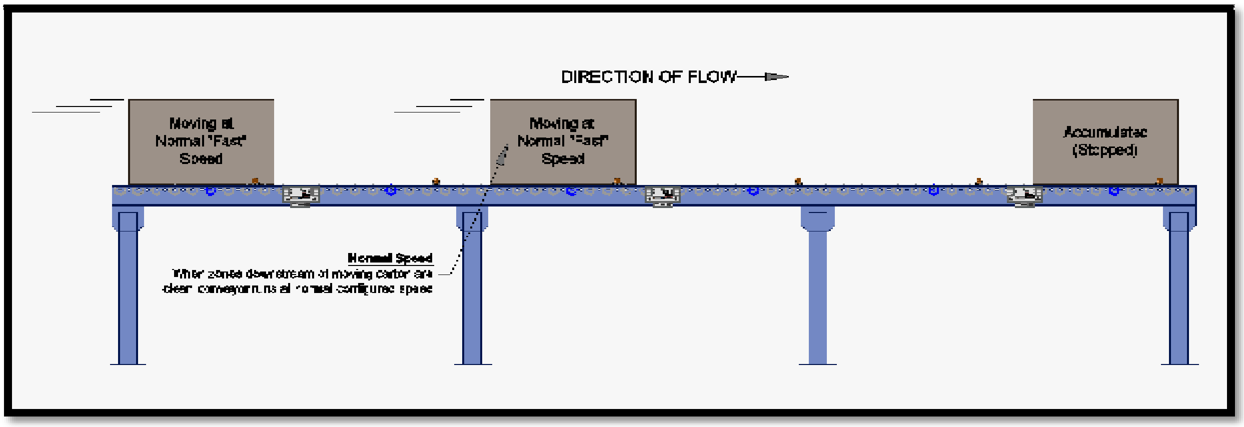


Figure 45 - Normal Running Before Look Ahead Enables

In Figure 45, conveyor runs at the speed configured for the *ERSC* per the *Auto-Configuration Procedure* or the value entered if it was manually changed.

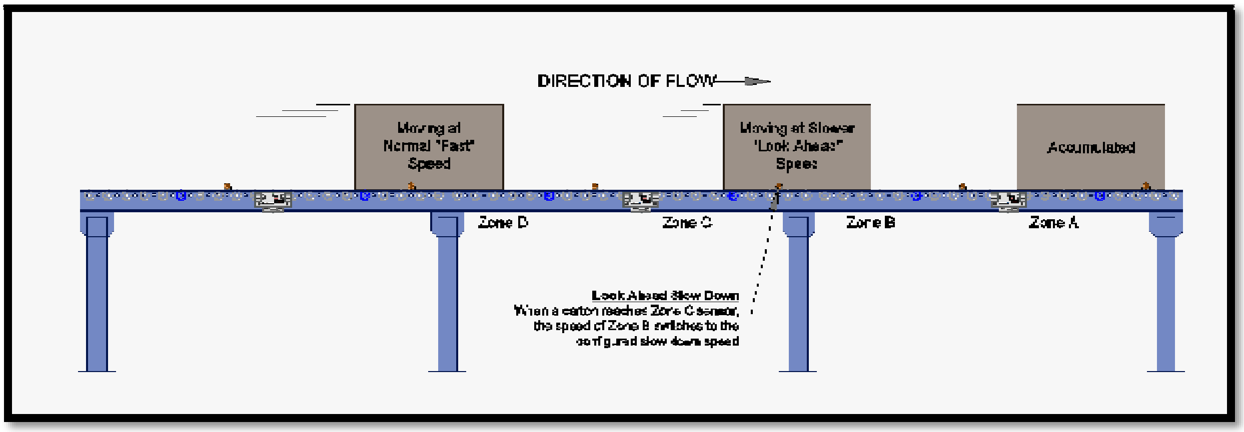
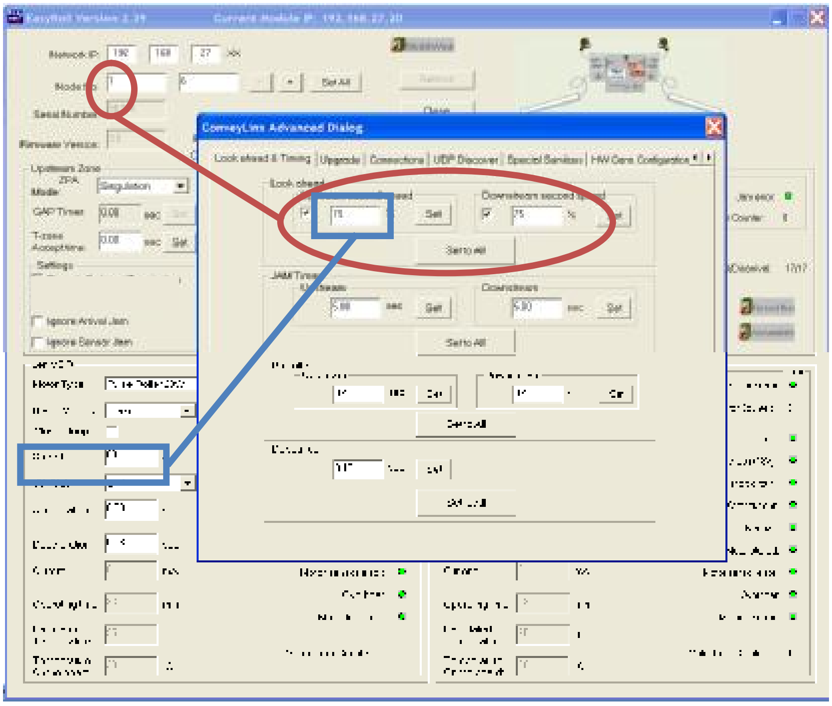
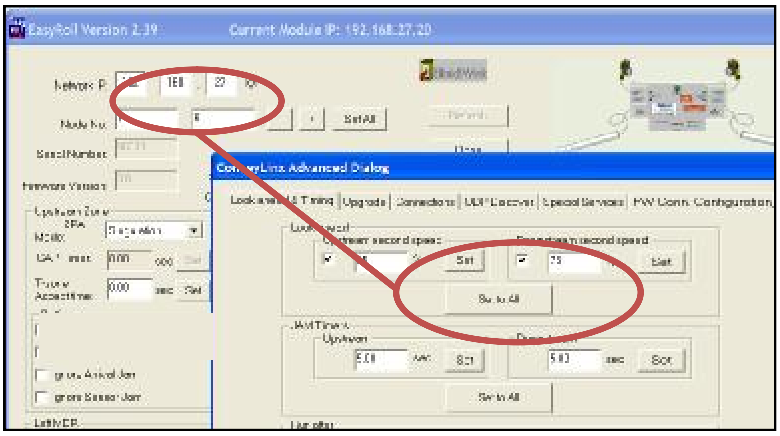


Figure 46 - Look Ahead Enabled

As shown in Figure 46, 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 slow down speed is in percent of the *Node's* normal speed as set on the main screen. In this example, the slow down 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 slow down speed would be "50% of 80% PWM".	

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	

Jam & Run After Timers

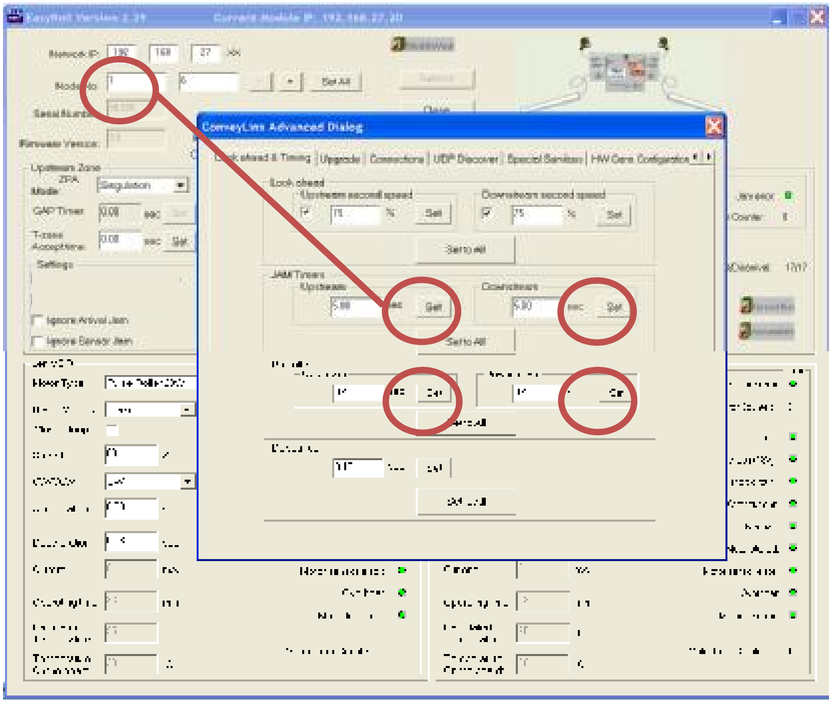
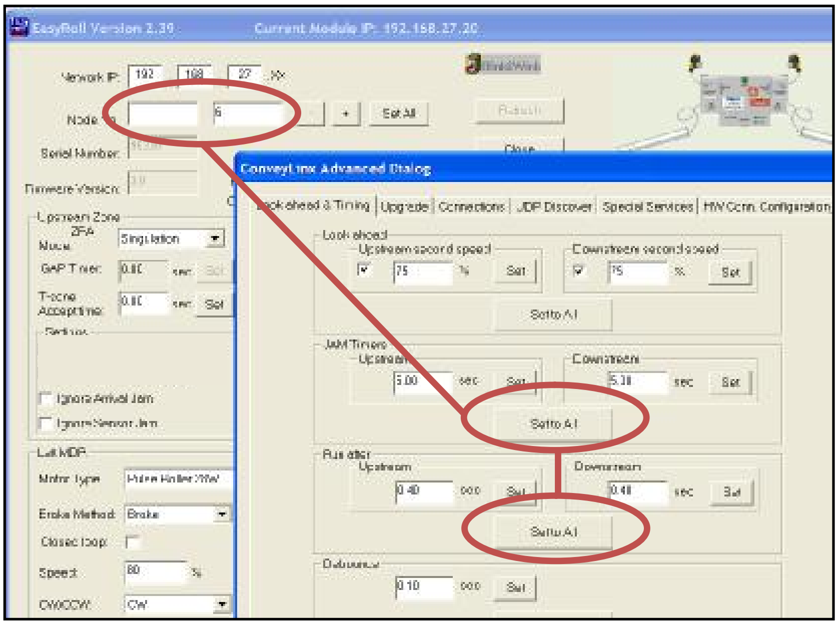
The *Jam* timers are used by the logic as the expected time it takes for a load to travel from one zone to the next. If this timer expires before the load reaches the next zone, the *ERSC* will indicate a Jam condition. Jam condition at any zone will automatically clear once its photo-sensor has been 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 is from 1.1 seconds to 10 seconds.

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.

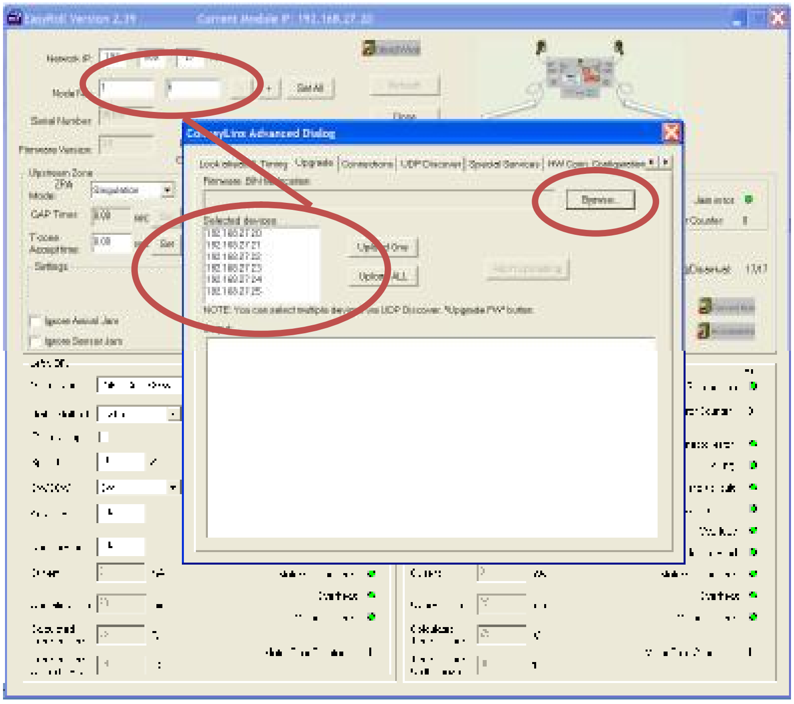
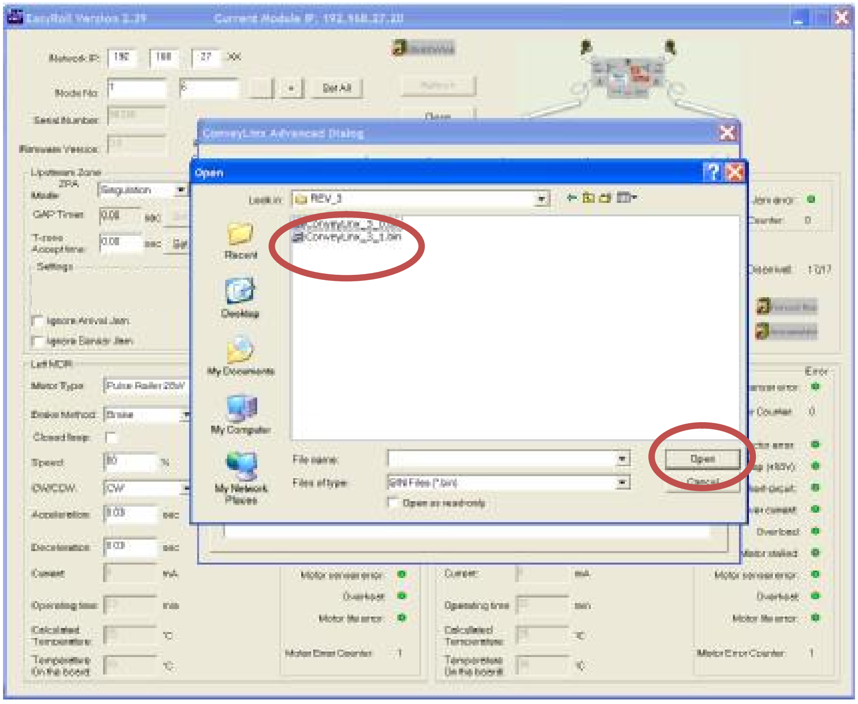
The default value for the *Run After* timer is 0.4 seconds and the valid range of values for any given *Run After* timer is from 0.1 seconds to 6 seconds.

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*.	
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.	

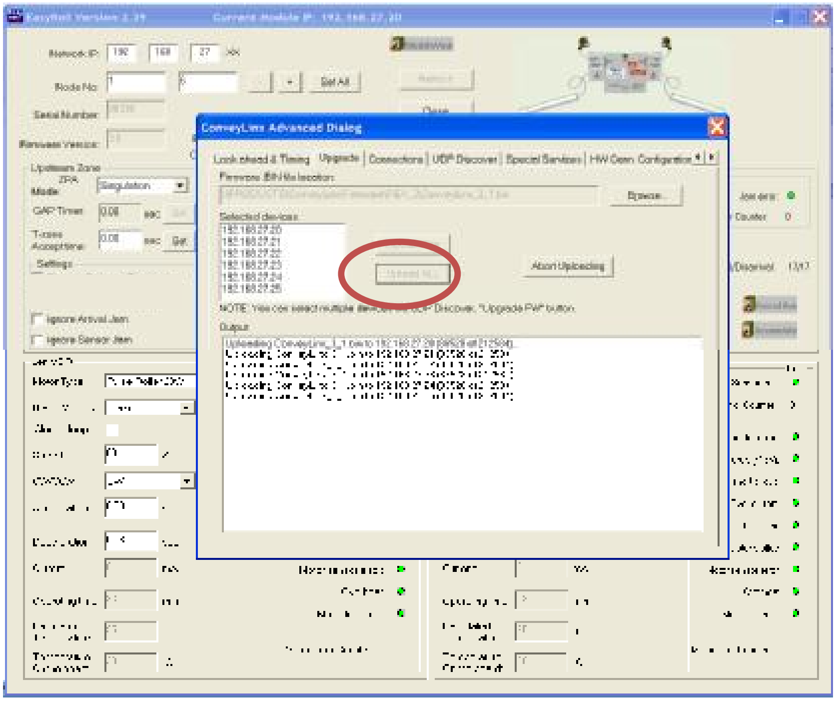
Upgrade

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.

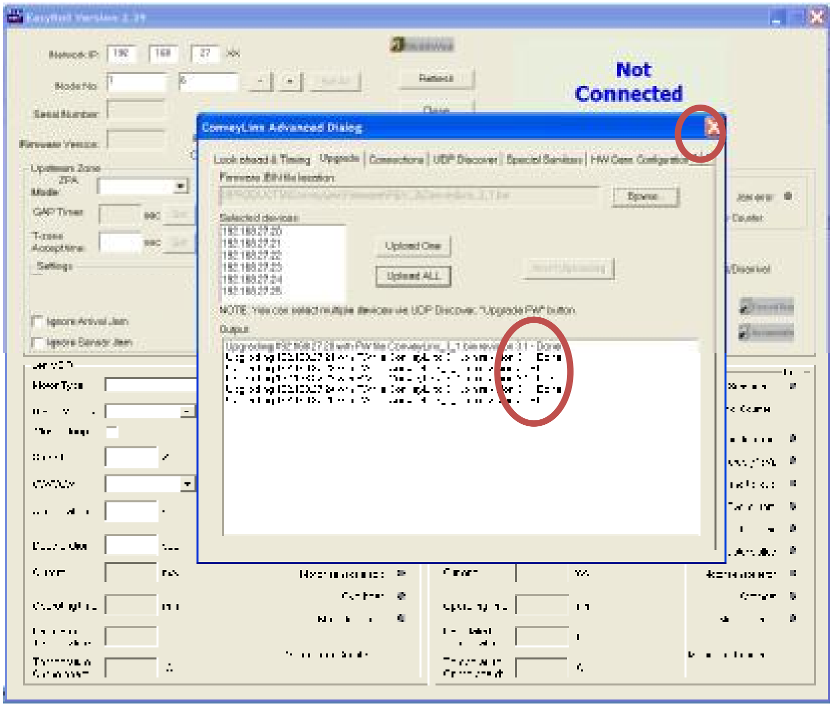
A firmware upgrade will be in the form of a data file sent to you or made available for download. The *Upgrade* utility allows you to browse for this data file and then select a single *Node* or group of *Nodes* to upload.

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 haw 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 47 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.

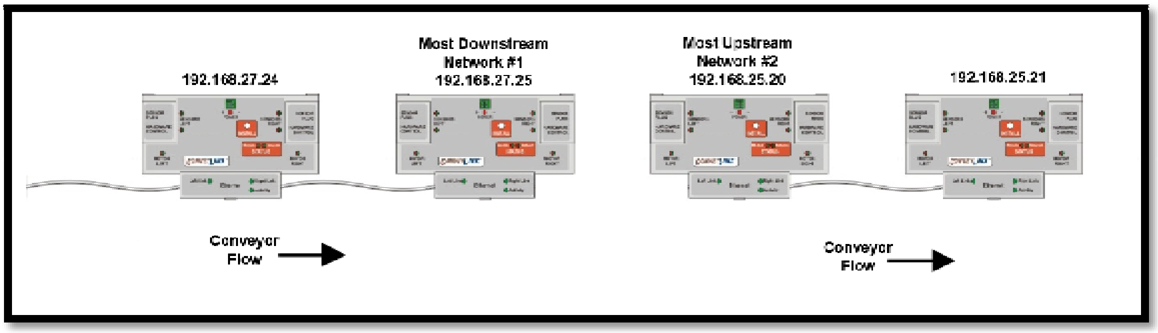


Figure 47 - Subnet Boundary Example

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 48.

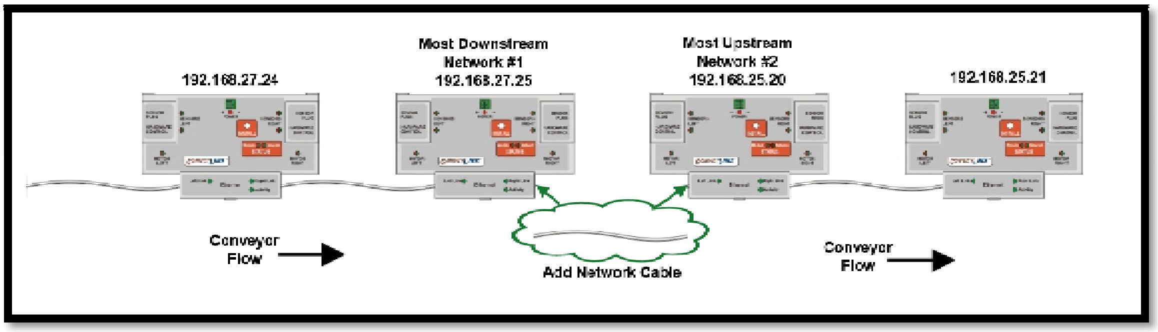
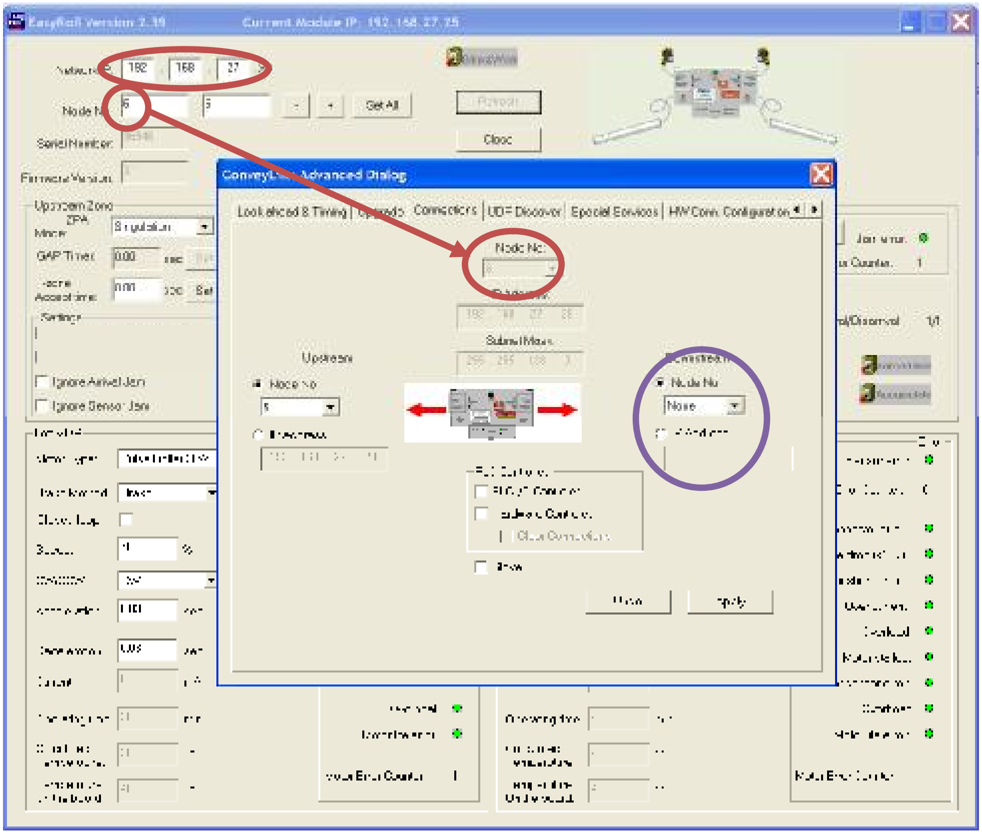


Figure 48 - Subnet Boundary Example with Cable

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.

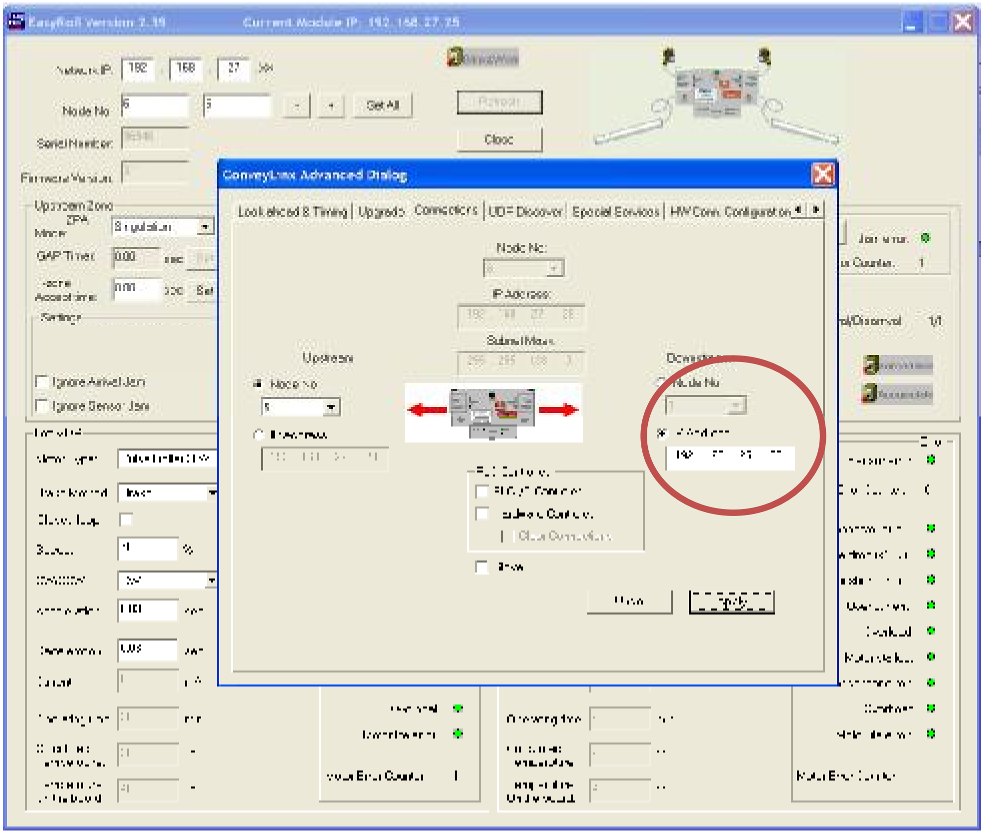
Configuring *Node* at 192.168.27.25



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".

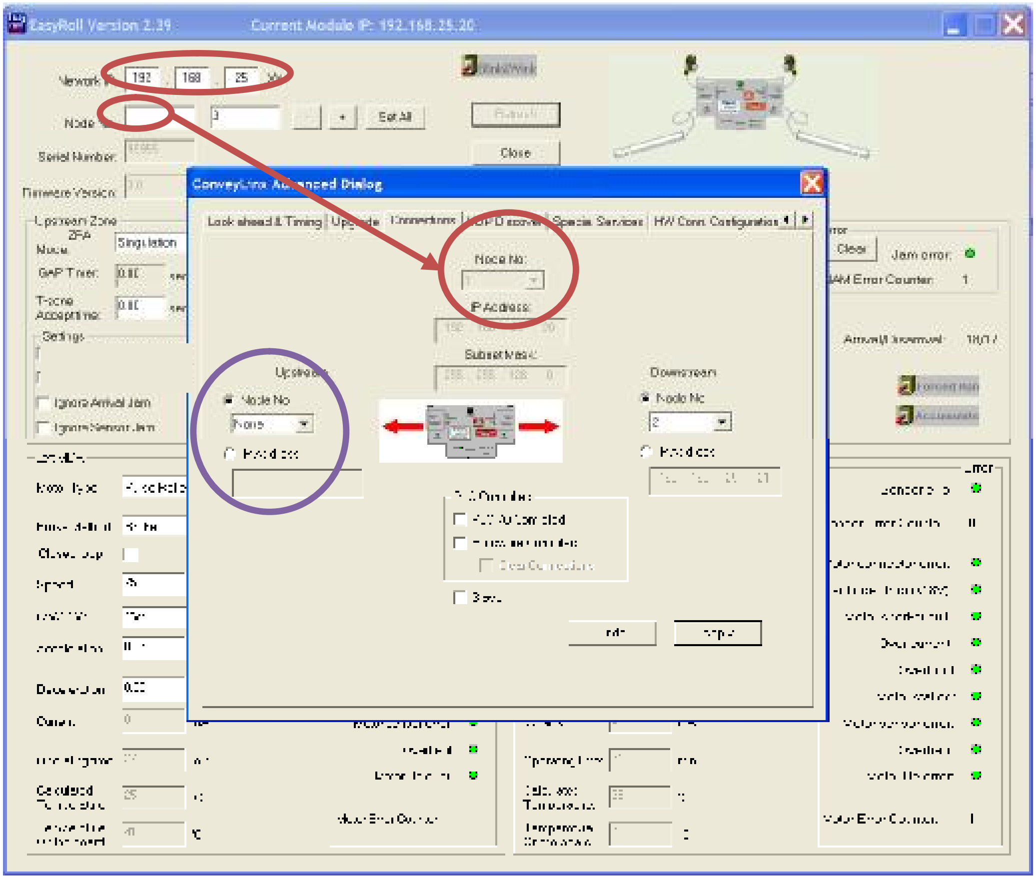


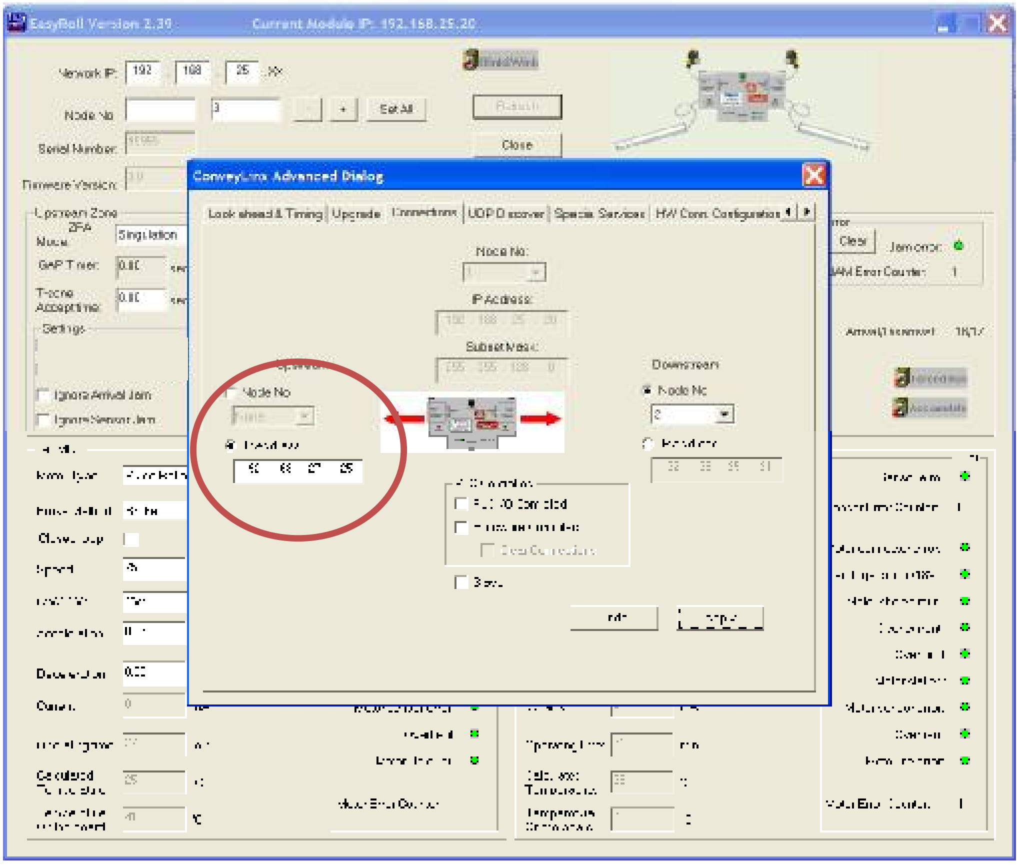
We want to change the Downstream flow to I.P. address 192.168.25.20 which is the next downstream *Node*.

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 itself.

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

<u>Configuring *Node* at 192.168.25.20</u>

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 itself.

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 Your 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 46. 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*)

Using Slave Mode for Lift Gate

The most common use of the *Slave* mode configuration available from the *Connections* tab selection is for a powered lift gate. Figure 49 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* 192.168.27.25; a load arriving at the downstream zone of *Node* 192.168.27.23 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 192.168.27.23 to *Node* 192.168.27.25 in a similar fashion as we did in section *Connect Two Networks Together* on page 93. Secondly, we will then instruct *Node* 192.168.27.24 to be a *Slave* to the upstream zone of *Node* 192.168.27.25. Finally, we will instruct *Node* 192.168.27.25 that *Node* 192.168.27.24 will be a *Slave* to the upstream zone on the Connections Tab of the Advanced Dialog Box for *Node* 192.168.27.25.

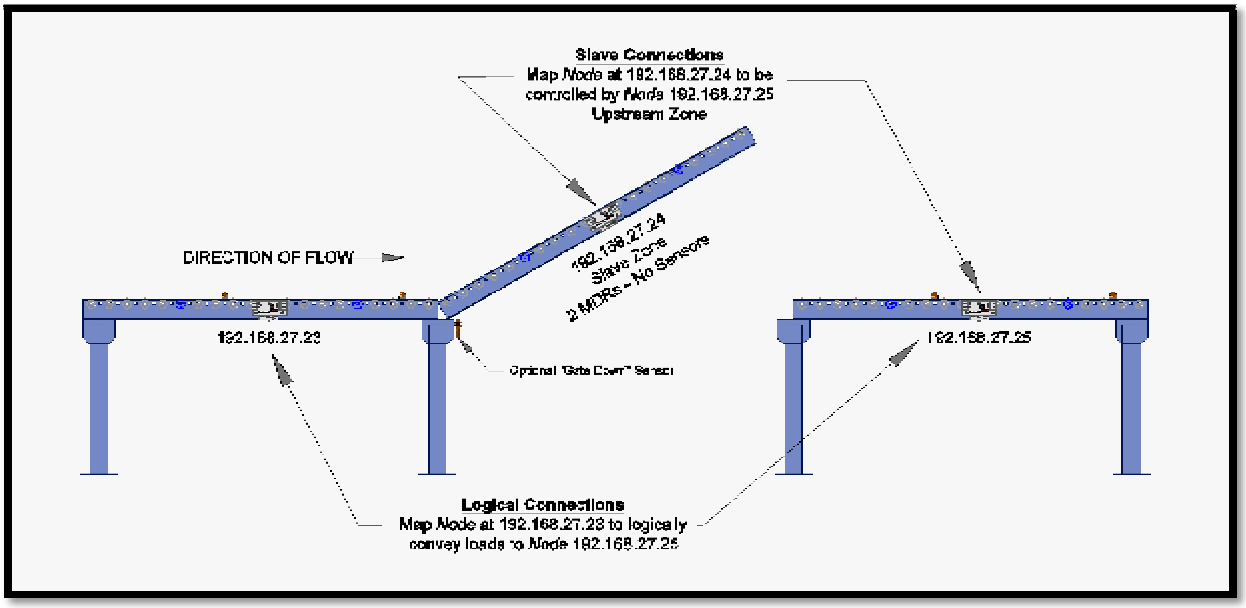
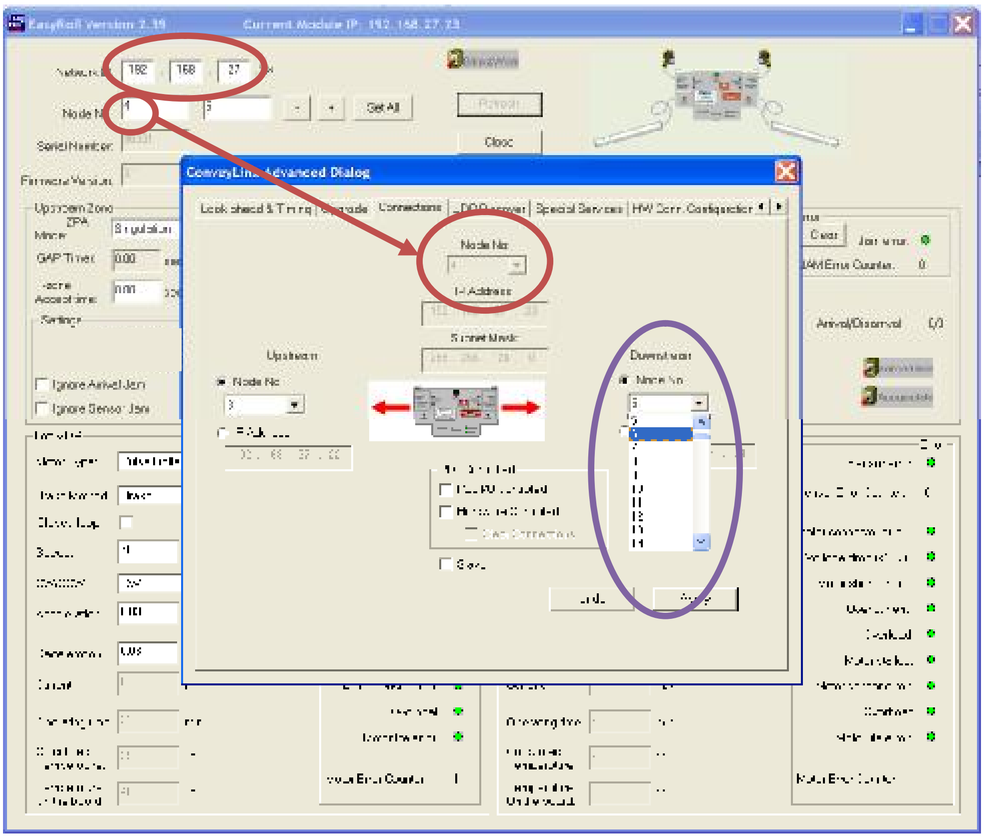


Figure 49 - Typical Lift Gate Example

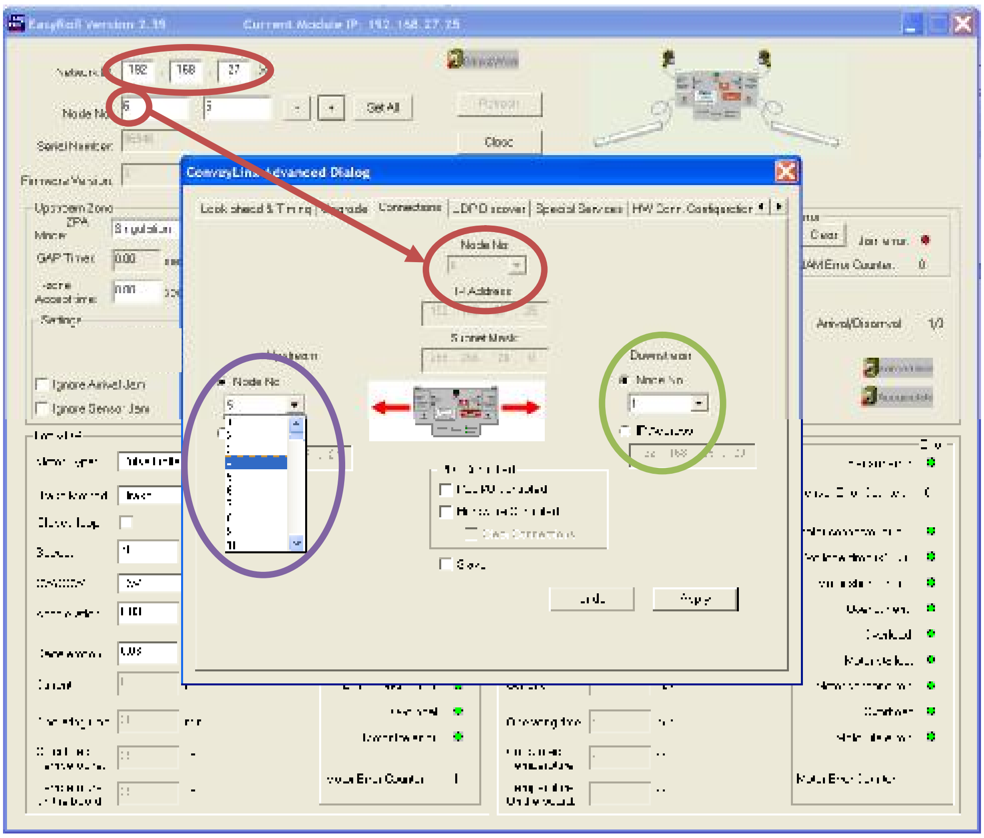
Configure *Node* 192.168.27.23



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* 192.168.27. Invoke the *ConveyLinx Advanced 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.

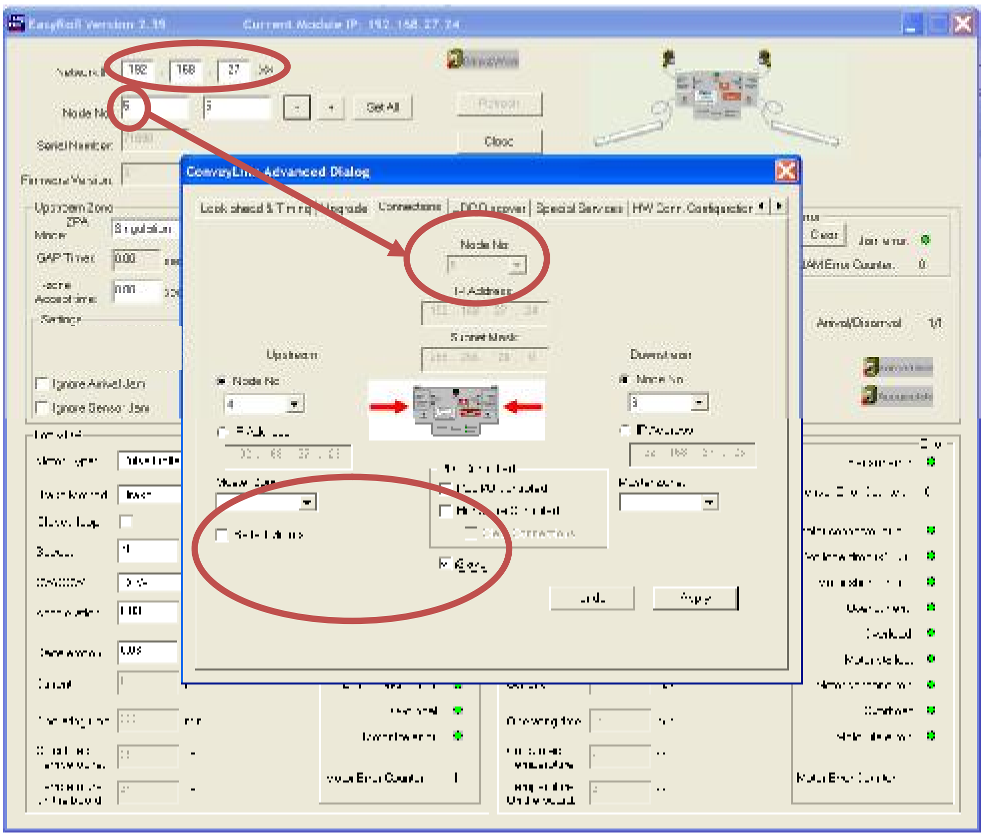
Configure *Node* 192.168.27.25

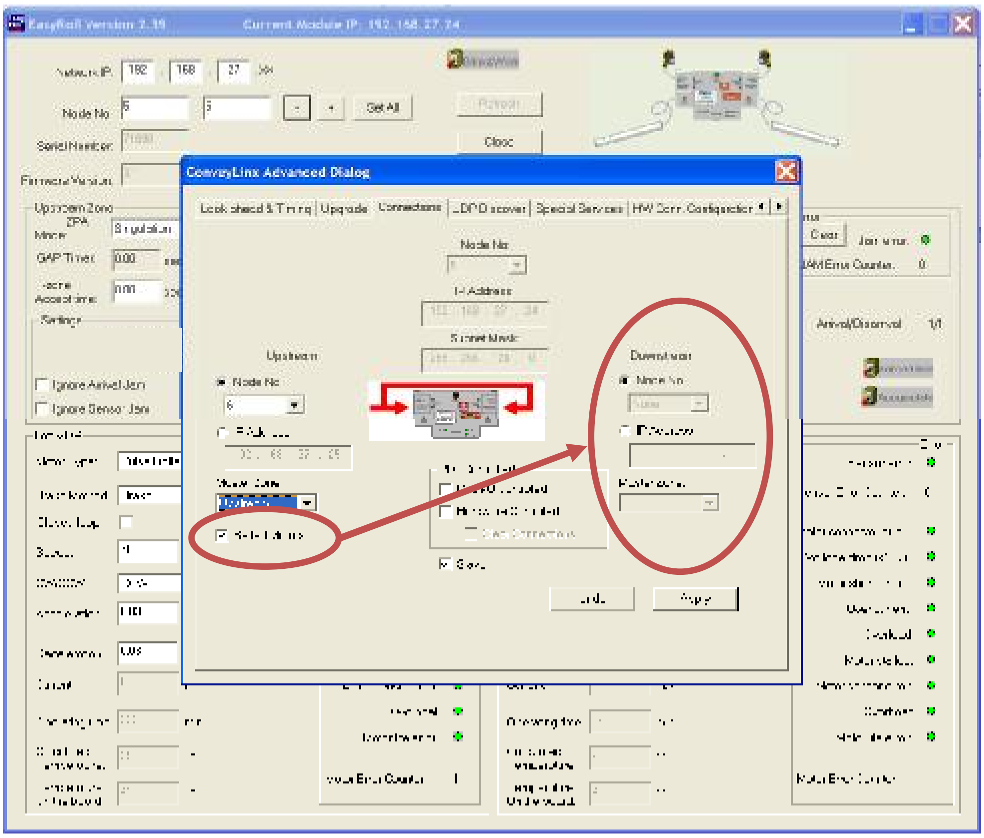


From the main screen, enter the correct *Subnet* and then select the proper *Node* within the *Subnet*. In this case it is *Node* 6 of *Subnet* 192.168.27. Invoke the *ConveyLinx Advanced Dialog*. Note that *Node* 6's information is displayed in the center and that it is greyed out.

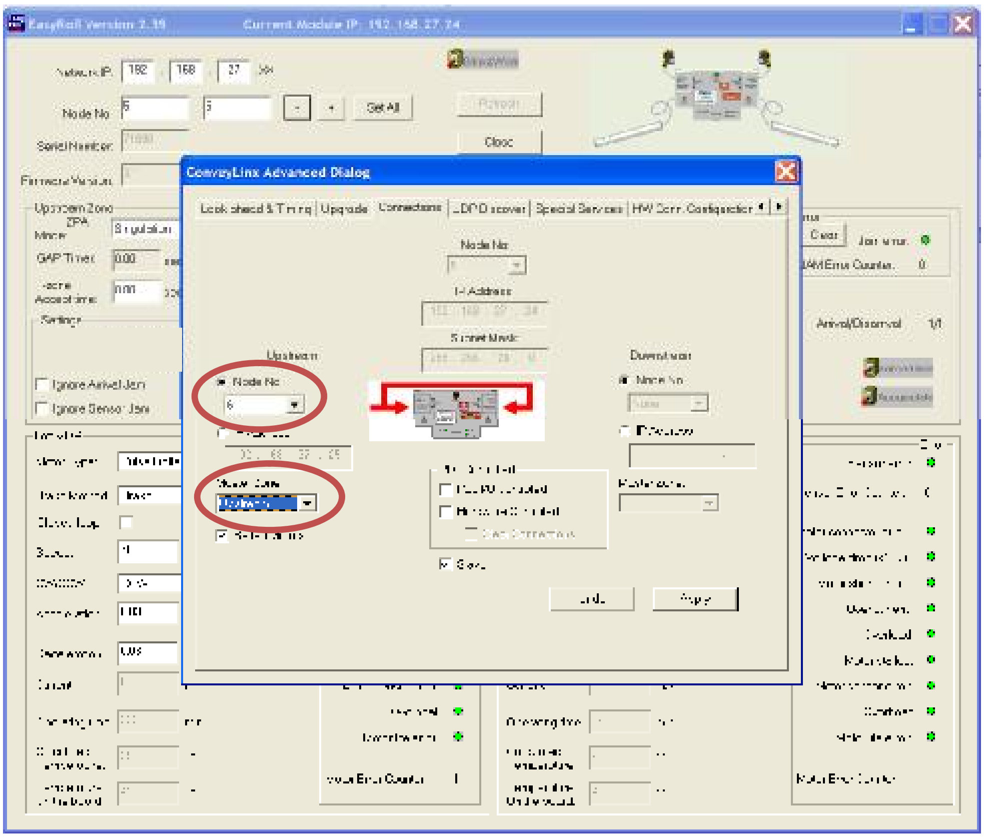
From the *Auto-Configuration Procedure*, *Node* 6's natural upstream *Node* is 5. In this case we want our upstream zone to be fed from *Node 4* instead of *Node* 5 because *Node 5* will be our *Slave* zone. For the Upstream zone, select *Node* 4 from the pull down box and click apply.

If you recall from our previous example, we configured the downstream connection of this *Subnet's Node* 6 to feed *Node 1* of a different *Subnet*.

Configure *Node* 192.168.27.24

From the main screen, enter the correct *Subnet* and then select the proper *Node* within the *Subnet*. In this case it is *Node* 5 of *Subnet* 192.168.27. Invoke the *ConveyLinx Advanced Dialog*. Note that *Node* 5's information is displayed in the center and that it is greyed out. From the *Auto-Configuration Procedure*, *Node* 5's natural upstream *Node* is 4 and its natural downstream *Node* 6. In this case we make *Node* 5 a *Slave* zone. Click both the "Slave" and "Belted Motors" check boxes.



With both "Slave" and "Belted Motors" boxes checked; the context of "Upstream" and "Downstream" changes from "external" connections to the *ERSC* to the module's "internal" upstream/downstream definition. The "Belted Motors" check box means that we want both MDR's on *Node* 5 to run together at the same time as if they were one motor. This makes *Node* 5 a "single zone" module. Any module that is logically a "single zone" internally only has an "upstream zone" not both an "upstream" and a "downstream". This is why *Node* 5's Downstream information is grayed out.



We want *Node* 5 to be controlled by *Node* 6, so we select *Node* 6 from the pull-down box.

We also need to define which of *Node* 6's zones (either its upstream or downstream zone) is to be the "Master Zone" that runs our *Slave* zone. In this case, we want *Node* 6's upstream zone to be the controlling zone for our *Slave*. Select "Upstream" from the Master Zone pull down box.

Click "Apply" button to download the changes to the module. It will take approximately 20 seconds for the module to accept the changes and restart.

In Figure 49, there is an optional "Gate Down" sensor shown. This can be provided to hard-wire back to the upstream zone *ERSC* (*Node* 192.168.27.23 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 44. 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.

UDP Discover

The *UPD Discover* 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 72 for details.

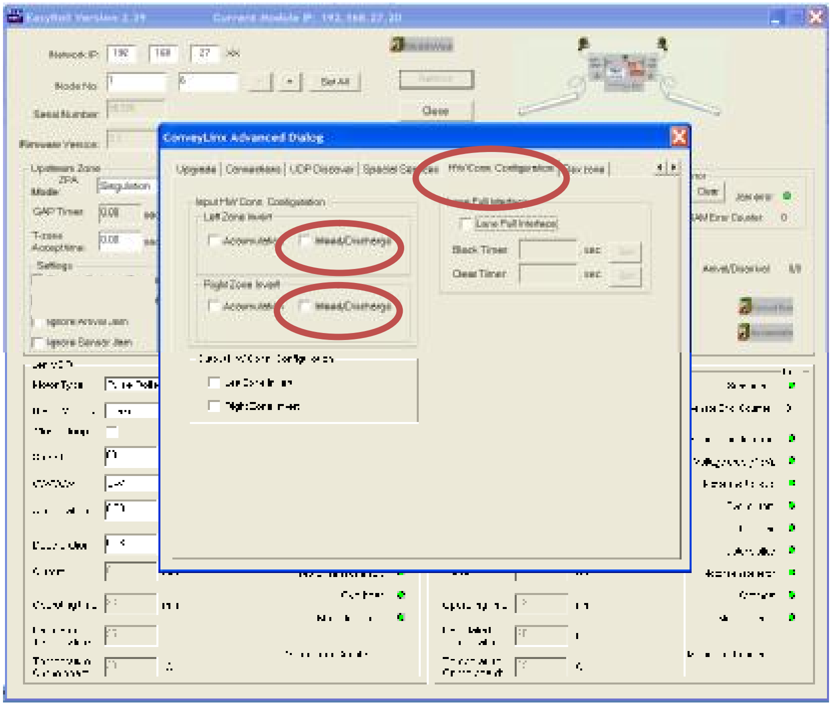
Special Services

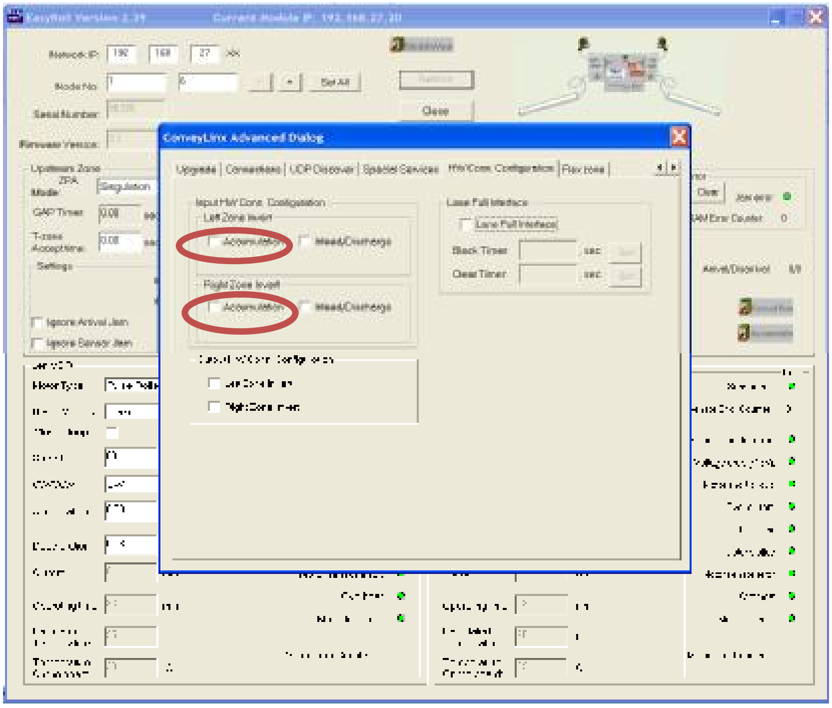
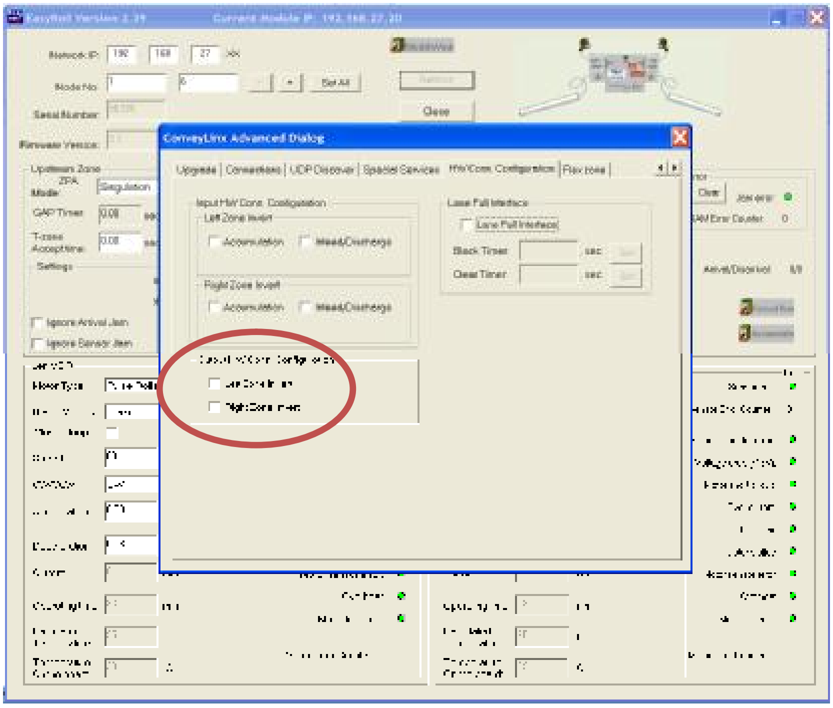
Each *ERSC* maintains a running time meter for each MDR connected to it. This value is displayed as *Operating Time* on the main screen (5). This screen on the *ConveyLinx Advanced Dialog* allows you to reset this meter in the event you have to replace a given MDR.

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*.

Hardware Connections 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.

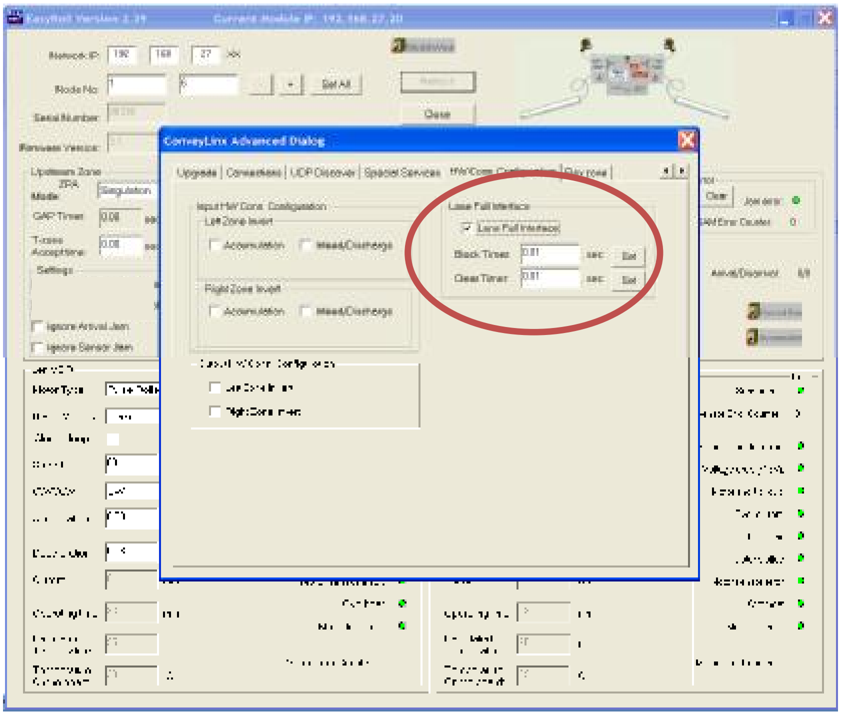
By default, the *ERSC* interprets the "Infeed/Discharge" input signal (Interlock Pin 4 on RJ-12 *Control Port*) when energized or ON to mean a logical "1". By clicking the check box to invert the "Infeed/Discharge" input signal, a de-energized or "OFF" condition will mean a logical "1" to the *ERSC* for the Interlock Pin 4 *Control Port* signal.	

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.	
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.	

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 46 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.

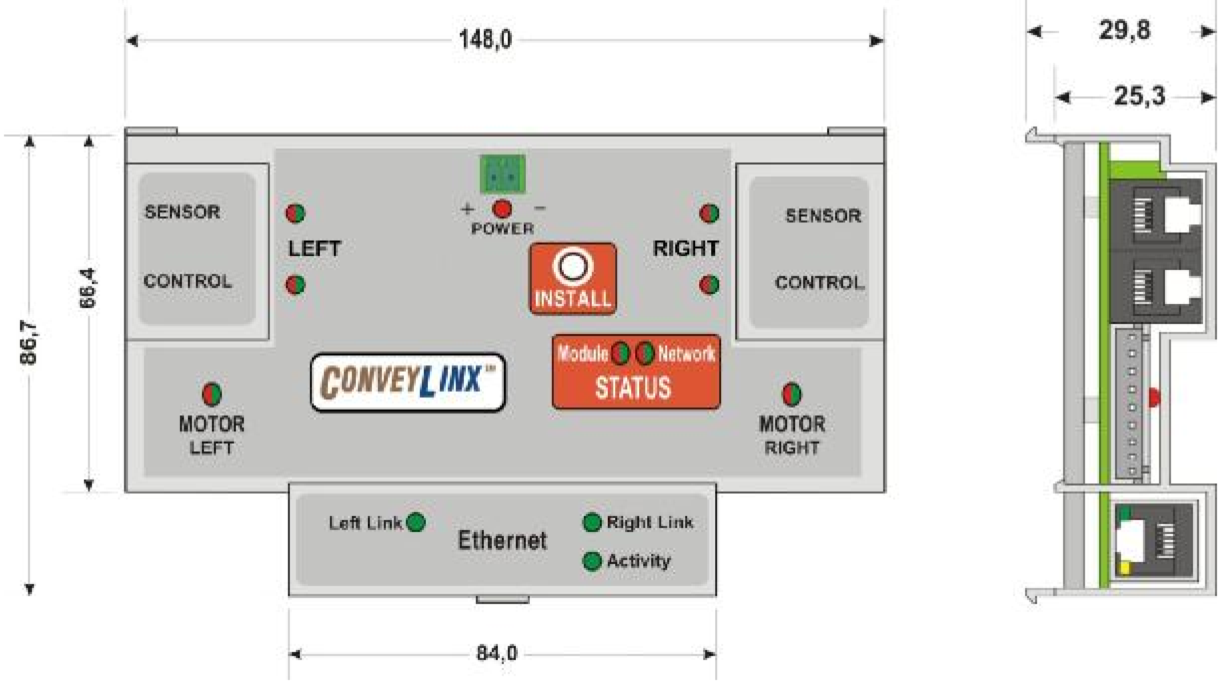
Section *Sensor in Control Port for Downstream Interlock* on page 49 describes plugging a sensor into the *ERSC Control Port* to provide a Downstream Interlock signal. The hardware Connections Configuration tab provides selection and adjustment to this functionality to allow the plugged in sensor to 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.	

Appendix A – Dimensions and Mounting Information

ConveyLinx Module Dimensions

Dimensions in mm



Conveyor Frame Fabrication Detail

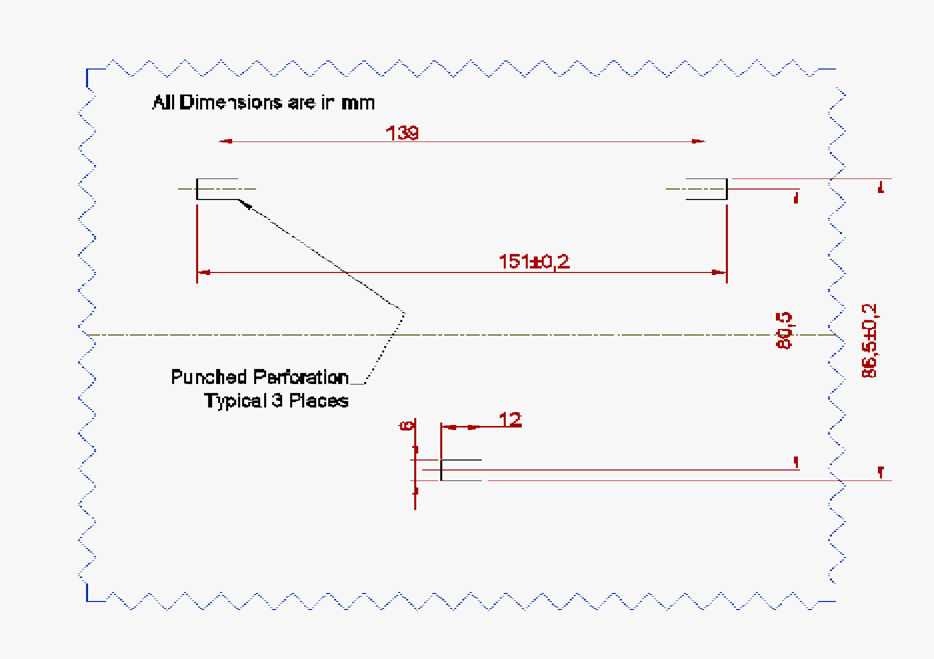


Figure 50 - Conveyor side frame elevation view of perforation

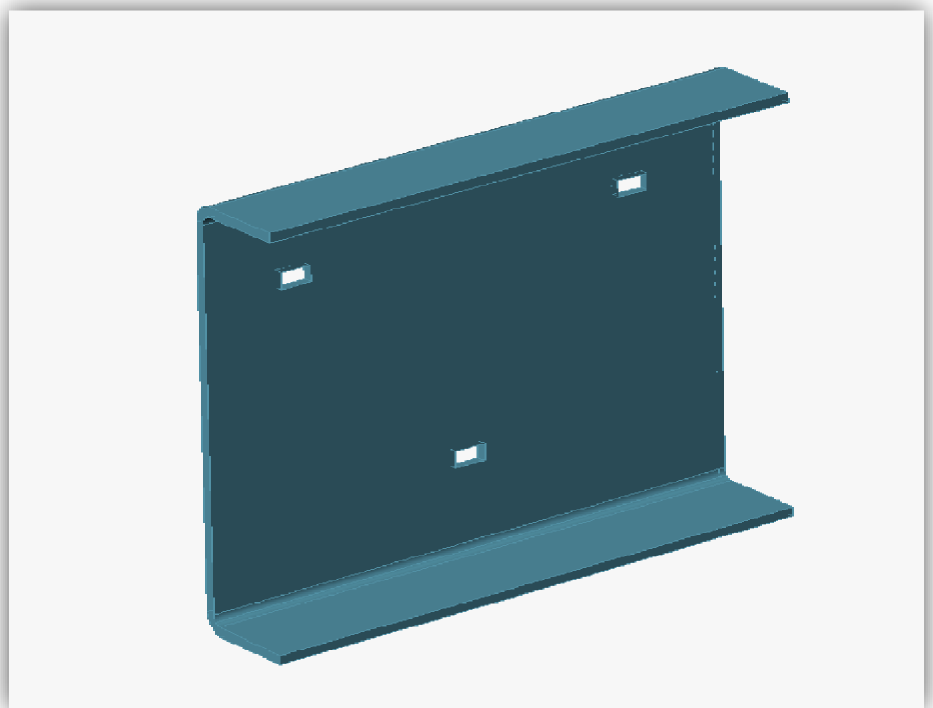


Figure 51 - Perforation pattern for conveyor side frame

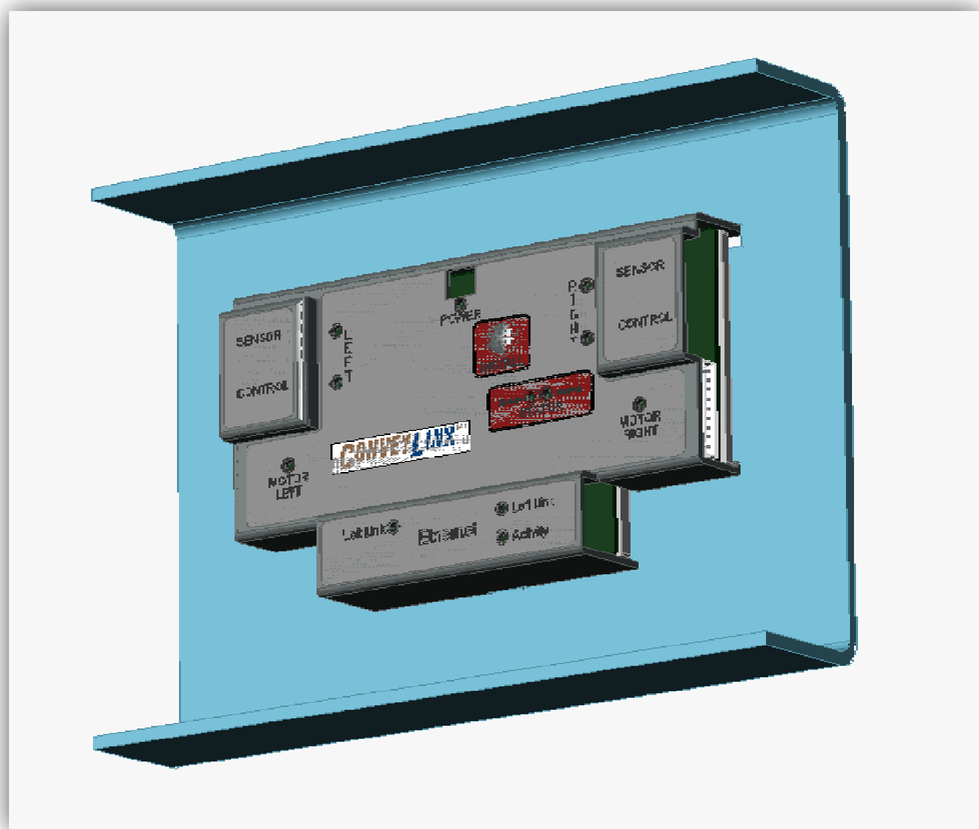


Figure 52 - Typical Rail Section with ERSC Mounted

Appendix B – Configuring Your PC for Ethernet Subnets

ConveyLinx, IP Addresses, and Subnets

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

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

`AAA.BBB.CCC.DDD`

Where `AAA`, `BBB`, `CCC`, and `DDD` can theoretically be any values from 0 to 255 each. For any given network, this I.P. address is unique for each PC on the network. The `AAA` value identifies the *Class* of the network and is most relevant to I.T. professionals and other entities such as internet providers, etc. For our purposes, we will use a *Class C* type network which uses the value *192* for `AAA`. For the `BBB` value we will use *168*. The *192.168* value for the first 2 octets of our I.P. address is the most common for user configurable networks. The values `AAA.BBB.CCC` together identify the *Subnet* that the PC will be connected. The *Subnet* can be thought of as a group of 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:

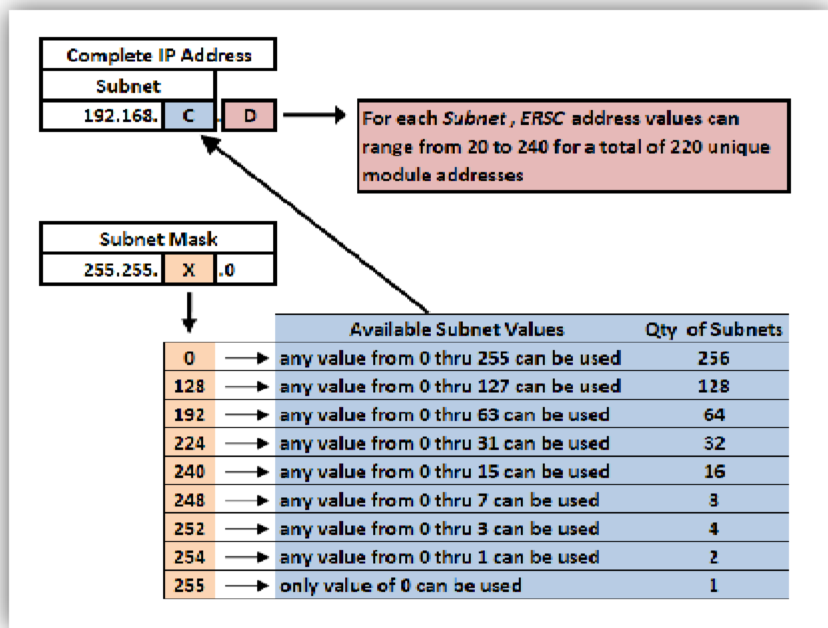


Figure 53 - Available Subnets per Typical Subnet Mask Values

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 you 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:

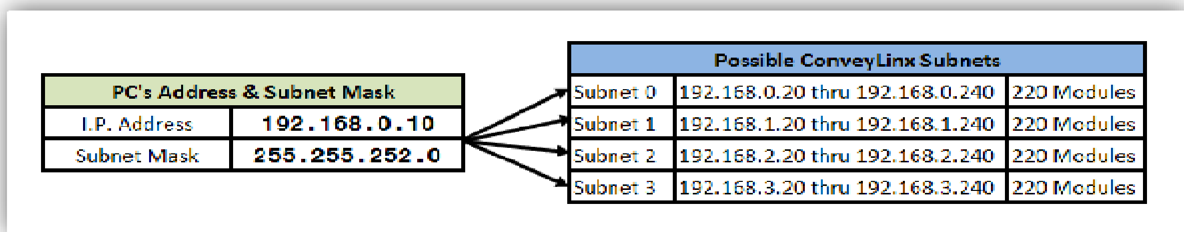


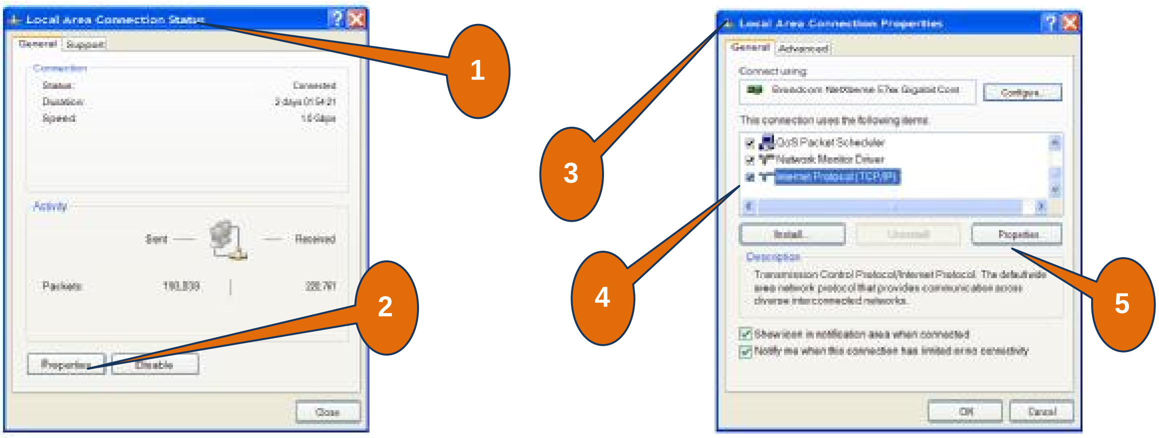
Figure 54 - IP Address Configuration Example

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.

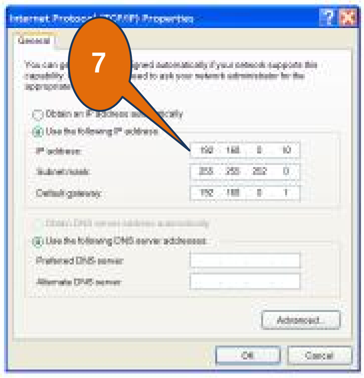
Also note that our example is utilizing all the possible *Subnets* for the Subnet Mask (255.255.252.0) shown. From Figure 53 above; we could have selected any of the values for X on the chart that was listed above the 252 value. In these cases there would simply be more *Subnets* available to address.

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 you 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	CA*ERSC*-INT-050	Hardware Interface Harness – RJ-12 – 50 cm
	CAERSC-INT-100	Hardware Interface Harness – RJ-12 – 100 cm
	CAERSC-INT-150	Hardware Interface Harness – RJ-12 – 150 cm
Shielded Ethernet Crossover Cable	CAERSC-ETH-100	Shielded Ethernet Crossover – RJ-45 – 100 cm
	CAERSC-ETH-150	Shielded Ethernet Crossover – RJ-45 – 150 cm
	CAERSC-ETH-200	Shielded Ethernet Crossover – RJ-45 – 200 cm
Breakout Module	ERSC-SE1	RJ-12 to Screw Terminal Breakout Module
	ERSC-SE2	RJ-12 to Screw Terminal Breakout Module with Output Amplifier and Bias Diodes
DC Power Supplies	IN-PS-10	MDR|Power 10amp@24VDC, 120VAC Input w/ Load Switch, Circuit Breaker, Poly Carbonate Enclosure
	IN-PS-20	MDR|Power 20amp@24VDC, 120VAC Input w/ Load Switch, Circuit Breaker, Poly Carbonate Enclosure
	IN-PS-40	MDR|Power (2) - 20amp@24VDC, 120VAC Input w/ Load Switch, Circuit Breaker, Poly Carbonate Enclosure
	IN-PS-10-480	MDR|Power 10amp@24VDC, 480VAC Input w/ Load Switch, Circuit Breaker, Poly Carbonate Enclosure
	IN-PS-20-480	MDR|Power 20amp@24VDC, 480VAC Input w/ Load Switch, Circuit Breaker, Poly Carbonate Enclosure
	IN-PS-40-480	MDR|Power (2) 20amp@24VDC, 480VAC Input w/ Load Switch, Circuit Breaker, Poly Carbonate Enclosure

Notes:

Industrial Software Co.

45, Lokorska Str.
1225, Sofia, BULGARIA
Phone/Fax: (+359 2) 975 11 80/1/2/3/4
E-mail: indsoft@einet.bg
www.indsoft.bg

Insight Automation Inc.

2748 Circleport Drive
Erlanger, KY USA 41075
859-647-1111
www.insightautomation.cc

Publication ERSC-1000 Rev 3.1 – July 2010