ZoneLink™ 4-Zone Controller

For use with ZL.S-DK101 and Microroller™

ZLC-6320-2 0905 TECHNICAL DATA SHEET

Description

The enhanced Holjeron ZoneLink™ 4-Zone Controller for use with DeviceNet™ has the features needed to control up to four zones in a material handling system, or to manage merges, diverts, transfers and zero pressure accumulation.

The new ZoneLink™ 4-Zone Controller includes advanced automatic accumulation functions including, but not limited to, train mode, workstation hold, and release timers. These make it easy to implement a conveyor system with minimal programming in the host controller.

The new ZoneLink™ controller isolates auxiliary I/O power from motor power and bus power, allowing you to interface to PLC's, sensors and other devices regardless of the power source.

Specifications

Part Numbers	4-Zone Controller for DeviceNet™		ZL.S-C411-D
DeviceNet Interface	Termination		5 pin M12 connector, Male
	DeviceNet Voltage Range		11-28 VDC
	Current Consumption		40mA @ 24V, 70mA @ 12V
	Data Rates		125, 250, and 500 kbps
	Product Revision		1.1
ZoneLink Port	Type		RJ-45
	Number		Four (4)
	Voltage Range		24 VDC
Auxiliary Inputs	Type		Current Sinking* or Sourcing
	Number		Four (4)
	Termination		Plug-in Terminal
	Voltage Range		10 to 28 VDC
	Maximum Current		On: 8.45 mA at 24 VDC (4.0 mA at 12 VDC) Off: 2 mA at <6 VDC
Auxiliary Outputs	Type		Current Sinking
	Number		Two (2)
	Termination		Plug-in Terminal
	Voltage Range		10-28 VDC
	Maximum Current		On: 500 mA Off: > 1 MΩ
Environmental	Temperature	Storage	-30° to 70° C (-22° to 158° F)
		Operating	0° to 60° C (32° to 140° F)
	Humidity		5-95% RH, non-condensing
	Vibration		2G at 10 to 500 Hz
	Shock		10G
Physical	Dimensions		5.75 H x 3.25 W x 1.75 D
	Weight		6.5 oz
	Mounting		Mounting Tabs
	Indication	MS/NS	Red/Green
		Activity	Red/Green

*Note: Use of sinking inputs precludes the use of outputs.

Warranty/Remedy

Seller warrants its products to be free from defects in design, material and workmanship under normal use and service. Seller will repair or replace without charge any such products it finds to be so defective on its return to Seller within 18 months after date of shipment by Seller. **The foregoing is in lieu of all other expressed or implied warranties (except title), including those of merchantability and fitness for a particular purpose.** The foregoing is also purchaser's sole remedy and is in lieu of all other guarantees, obligations, or liabilities or any consequences incidental, or punitive damages attributable to negligence or strict liability, all by way of example.

While Holjeron provides application assistance, personally and through our literature, it is up to the customer to determine the suitability of the product in the application.

All information contained herein, including illustrations, specifications and dimensions, is believed to be reliable as of the date of publication, but is subject to change without notice.

Complementary Products

Holjeron manufactures a complete line of smart conveyor control equipment. To complete your system, have you considered:

Stack Light Controllers for DeviceNet

Light Stacks for DeviceNet

Operator Panels for DeviceNet, Multiple function

Push Button Controllers for DeviceNet, Multiple I/O

Low Profile I/O for DeviceNet, Multiple I/O

Motor Starter Controllers for DeviceNet

ZoneLink™ .S ZPA Module for 22W and 35W Microrollers w/ Auxiliary I/O

ZoneLink™ .S Driver Module for 22W and 35W Microrollers

To request pricing and availability, or to place an order:

Contact us

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Support issues: support@holjeron.com

About Holjeron

Our products are designed and produced by us

If you need this modified or that to be changed, it can be done. We give you the technology that best suits your needs. We understand Common Industrial Protocols (CIP) such as DeviceNet and Ethernet/IP, as well as CANOpen and Smart Distributed System (SDS.) Our engineers can supply the distributed I/O solutions that meet your specific needs.

We push intelligence to the process

Holjeron's smart quick-connect products can reduce wiring and give you diagnostics designed for your material handling system. Our products are designed with your system in mind. Using industry standards, we explore new ways to make things work in industrial automation. We apply the requisite technology to deliver the solution your system needs.

Want to kick around options?

Call us. Where else are you going to find people who love talking about this stuff? And who know enough to be helpful? The number to connect you to someone who understands your business – **503.582.0820**

Membership

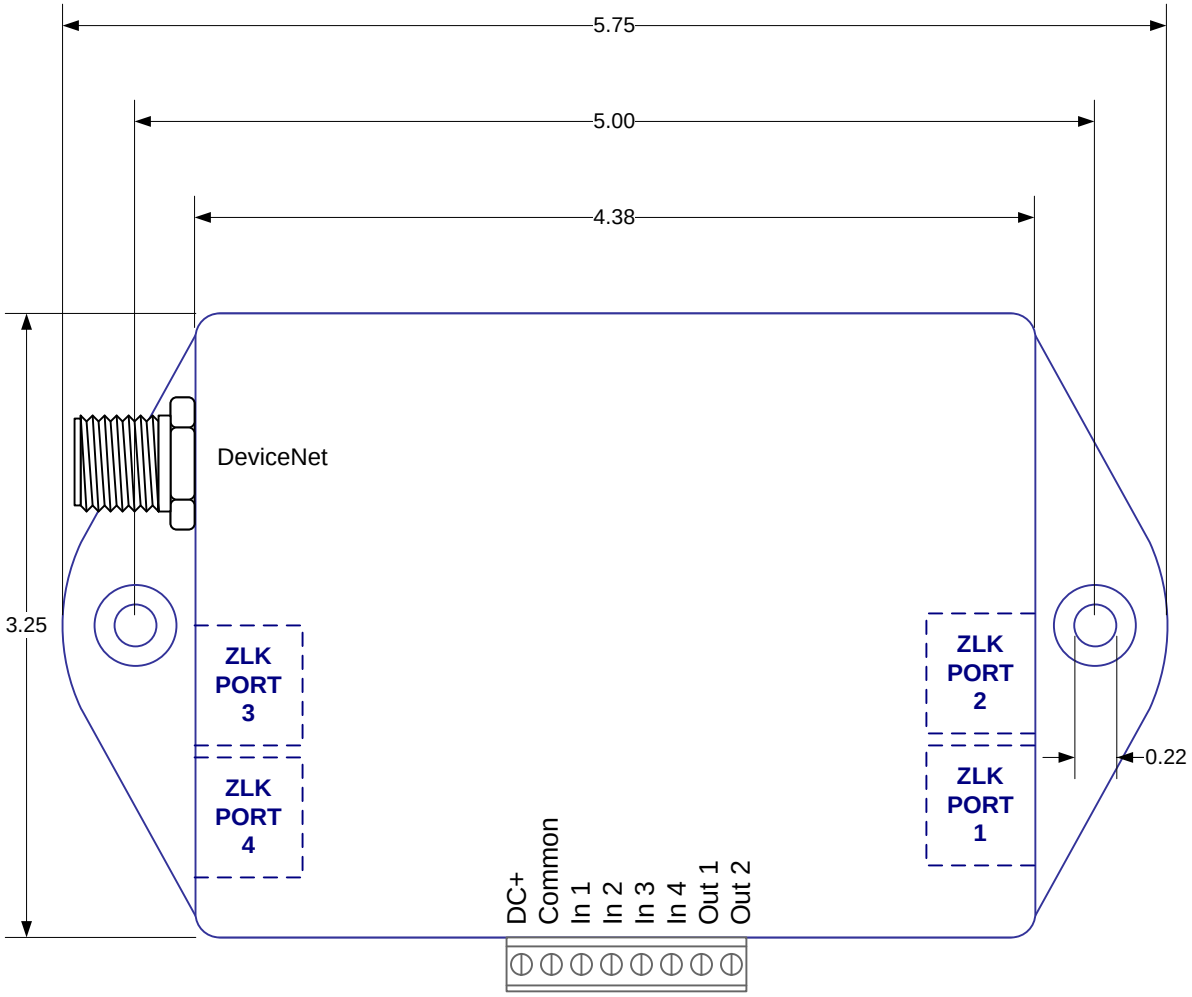
Holjeron is an active participant in key industry organizations and standards bodies.

DeviceNet www.odva.org

MATERIAL HANDLING INDUSTRY OF AMERICA www.mhia.org

Holjeron is a wholly-owned subsidiary of Matthews International Corporation

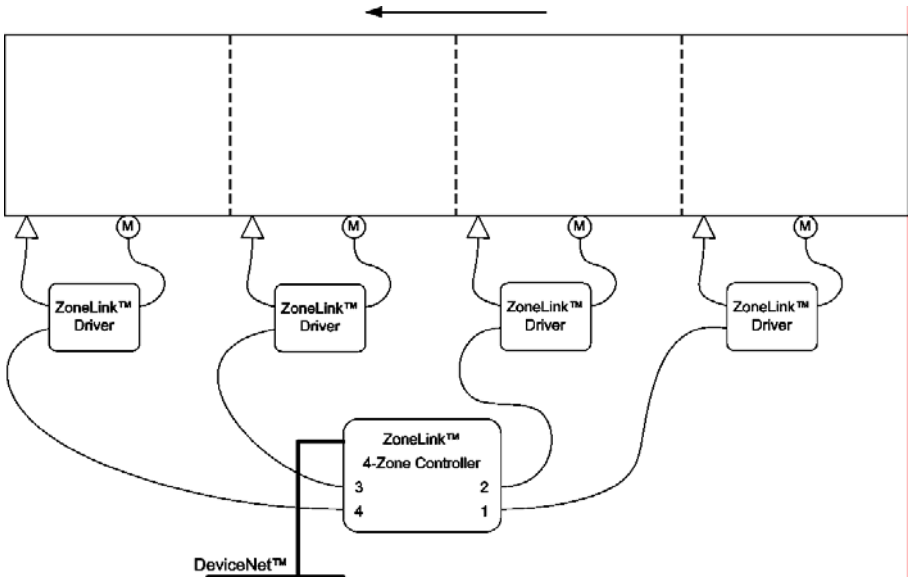
Dimensions



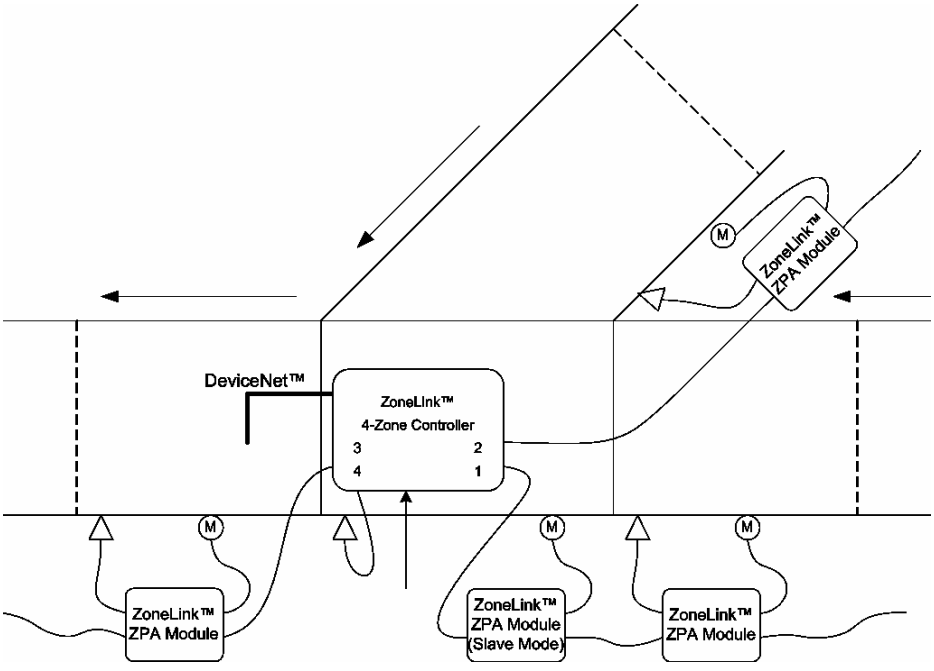
Aux I/O

Installation Diagrams

4-Zone Section – Manual Mode with Driver Modules or Automatic Accumulation Mode



Merge – Manual Mode with Upstream/Downstream Ports

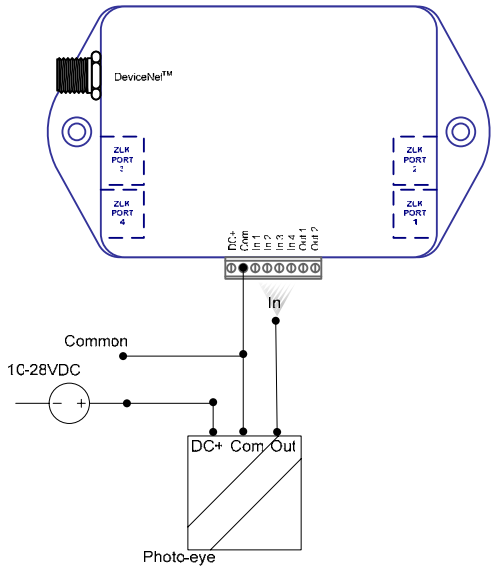


Wiring

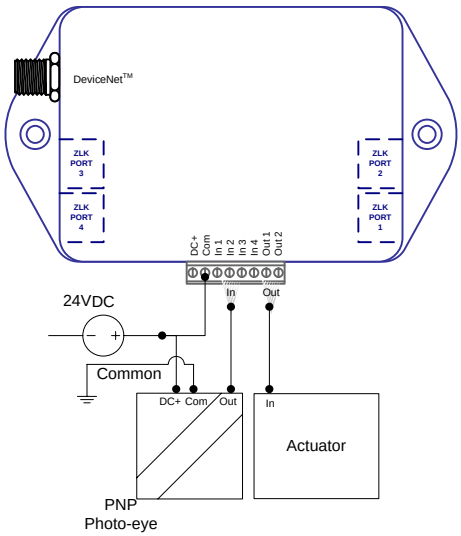
Input/Output

The ZL.S-C411-D isolates auxiliary I/O power from motor power and bus power. Therefore, any DC power source from 12-24 volts can be used to activate the four inputs and 2 outputs. Inputs can be sourcing or sinking. Outputs are sinking. However, outputs may only be used simultaneously with sourcing inputs. Bus and roller power may not be mixed across the I/O ports. The following represent typical use models for the ZL.S-C411-D I/O ports.

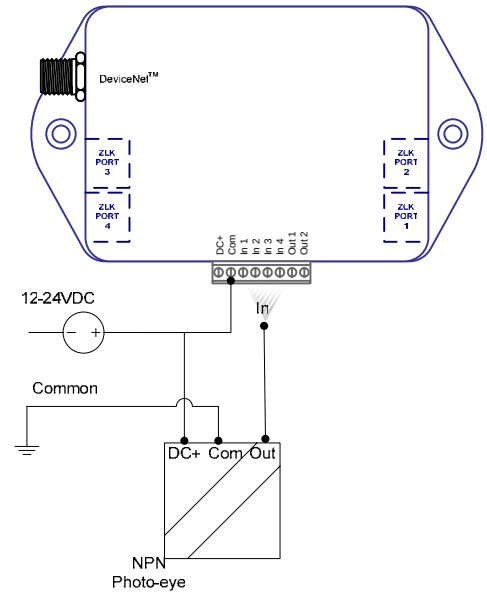
PNP Sensor



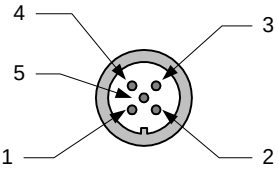
Output (Sinking)/Input (Sourcing)



NPN Sensor



DeviceNet Connector



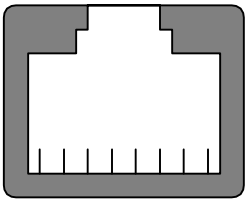
5 Pin Male

1	Drain
2	DC +
3	DC Common
4	CAN_H
5	CAN_L

ZoneLink™

The ZoneLink™ connections are RJ-45 jacks with pin assignments as defined in the diagram below. ZoneLink™ is designed to use standard Ethernet patch cables (Category 5, 5e or 6). Each port in a ZoneLink™ Controller can be configured to connect to a driver module, an upstream ZoneLink™ system, or a downstream ZoneLink™ system. The input and outputs for each port type are listed below.

ZoneLink™ RJ-45 Connector



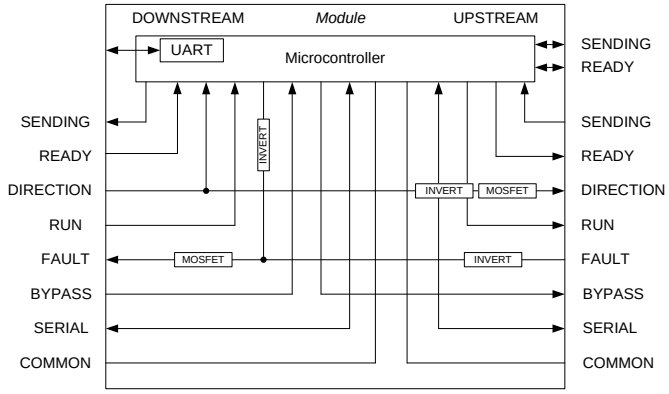
ZoneLink™ Port Pin Assignments

Pin	*Function*	*Controller Port Mode*		
		Driver	*Upstream*	*Downstream*
1	SENDING	Input	Input	Output
2	READY	----	Output	Input
3	DIRECTION	Output	Output	Input
4	RUN	Output	Output	Input
5	FAULT	Input	Input	Output
6	BYPASS	Output	Output	Input
7	.S COMM	Bi-Dir	Bi-Dir	Bi-Dir
8	COMMON	Signal common for all lines		

Interfacing to ZoneLink™ ZPA Modules

When interfacing upstream or downstream to ZoneLink™ ZPA modules, each input and output has a specific function as depicted in the block diagram below. The table below also describes each pin function when a ZoneLink™ Controller port is configured for upstream interfacing.

ZoneLink™ ZPA Module Block Diagram (With .S Communications)



The DIRECTION and FAULT lines have circuits that echo the input state to the output. This provides direct input-to-output, allowing unlimited number of units in a system.

Interfacing Upstream

Signal	**I/O**	**Function**
SENDING	Input	Enabled by ZPA module that product is being transferred.
READY	Output	Enabled by controller to let ZPA module know that it's okay to release product downstream.
DIRECTION	Output	Not active with ZPA modules
RUN	Output	Directly runs ZPA modules in SLAVE or MANUAL mode, or used to purge when used with BYPASS.
FAULT	Input	Signals the controller that a fault condition exists upstream.
BYPASS	Output	When enabled by the controller all connected ZPA modules will instantly stop running. A line can be purged using the RUN signal. Removing the BYPASS will cause a ZPA system to reset, and begin normal operation.

DeviceNet™ Operation

The ZoneLink™ 4-Zone Controller is a vendor-specific device functioning as a "Group 2 Only Server". In addition to explicit messaging, polled I/O and change-of-state/cyclic timer are supported for the transfer of input and output information. Once a polled connection is established, the module expects a poll at least every 10 seconds, otherwise the module will time out and take action as specified in the watchdog timeout action attribute. Changing the Expected Packet Rate (EPR) for the polled connection, which is contained in Object 5, Instance 1, attribute 9, can alter the connection timeout.

Configuration Tools

The ZoneLink™ 4-Zone Controller can be configured using several off-the-shelf DeviceNet™ configuration tools. Consult the manual for the configuration tool being used.

Minimum Setup

The steps described below are the minimum configuration steps required to install a ZoneLink™ 4-Zone Controller.

Device MAC Id

Set the MAC Id of the device. All units are shipped from the factory as **address 63**.

Note: Set the MAC Id before attaching a ZoneLink™ Controller to a complete bus. Otherwise, multiple devices may reside at the default address of 63.

Mode Configuration

The **Zone Group Object (Class 102, Instance 1)** is used to configure the basic function of the ZoneLink™ 4-Zone Controller. This includes what mode the Controller is operating (manual interface or ZPA control), and configuration options for each specific mode.

During run-time, the Zone Group Object also contains discrete inputs and outputs that are mapped to their respective assembly objects. These I/O points provide an external interface for control. Consult the Input Variable and *Output Variable* sections of this document for details.

Operating Mode

The ZoneLink™ 4-Zone Controller for DeviceNet™ is capable of automatic zero pressure accumulation with little external control logic, or can be used as application-specific remote I/O (manual mode). This provides the user with flexibility when applying a Holjeron ZoneLink™ Controller. The **Operating Mode (attribute 16)** in the Zone Group Object is used to configure the mode.

An Operating Mode of 0 is for **Manual Mode**, which is the default. In Manual Mode, the Zone Control and Zone Group Objects are not functional. Each ZoneLink™ port, however, can be configured to control a Driver Module, or can be configured to connect to Upstream or Downstream ZoneLink™ systems. See the section labeled ZoneLink™ Port Object for details.

An Operating Mode of 1 is for **Accumulation**. This allows for configuring the functionality of a transport conveyor.

Manual Configuration

The **ZoneLink™ Port Object (Class 100, Instances 1-4)** allows for each ZoneLink™ Port to be configured for the function to be performed. It also provides control for interfacing to a ZoneLink™ Driver Module or upstream and downstream ZPA Modules. In Manual Mode, all ZoneLink™ signals can be read from or written to through the Input or Output variables. Thus, the upstream and downstream modes also allow the ZoneLink™ Controller to be used in a merge, divert or transfer application in the middle of ZoneLink™ transport lanes.

See the section titled ZoneLink™ for using the inputs and outputs of a ZoneLink™ port.

Port Type [Attribute 9]

When in Manual Mode, there are three (3) different port configurations. In Accumulation Mode, the ZoneLink™ Ports are automatically configured for Driver Modules.

Value	Port Type
0	Driver Module Ports
1	Upstream Ports
2	Downstream Ports

Driver Module Ports are connected to a driver module. The basic signals for RUN, DIRECTION and FAULT are active; and the SENDING line is used to transmit sensor state from the Driver Module. If ZoneLink™.S Driver Modules are used then the serial communications is also active.

Upstream Ports are used to communicate upstream to a ZoneLink™ system. The ZoneLink™ Controller can then be used to handshake with the last zone in the lane, as well as control global lines, such as BYPASS and RUN.

Downstream Ports are configured to communicate downstream to a ZoneLink™ system. The ZoneLink™ Controller can then handshake with the first zone in the connected lane.

See the section on Host Controller Input Variable and Host Controller Output Variable on which inputs and outputs are active for each port type.

Speed Settings [Attributes 12 & 13]

**** * Applies Only to ZoneLink™.S * ****

When using the ZoneLink™ 4-Zone Controller with ZoneLink™.S Driver Modules, each powered roller can be configured to have two speeds. The desired speeds are downloaded from the ZoneLink™ Controller to the Driver Module from RUN SPEED and BYPASS SPEED.

When the Bypass/Speed Output is OFF the roller will run at **RUN SPEED (attribute 12)**, and when the Bypass/Speed Output is ON the roller will run at **BYPASS SPEED (attribute 13)**.

All speed settings are in RPM, with a maximum value of 8191. Consult the documentation for the motorized roller for associated line speed.

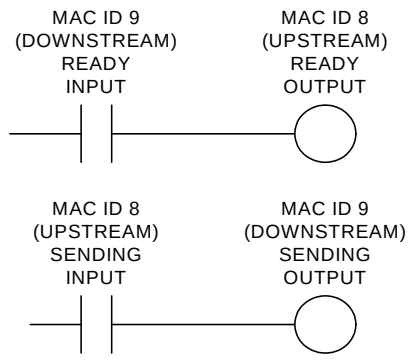
Accumulation Configuration

When operating in automatic Accumulation Mode, interfacing upstream and downstream between adjacent ZoneLink™ Controllers, or to control infeed and outfeed to a system is relatively simple. In Byte 5 of the input variable there are bits defined as UPSTREAM READY and DOWNSTREAM SENDING. In Byte 5 of the output variable are bits defined as DOWNSTREAM READY and UPSTREAM SENDING.

The UPSTREAM READY bit in the input variable lets a host controller know the ZoneLink™ Controller is able to receive a unit into zone 1. The DOWNSTREAM READY output bit in the adjacent upstream controller is then energized by the host controller to indicate the downstream ZoneLink™ Controller is able to receive a unit. Conversely, the DOWNSTREAM SENDING input in an upstream controller is mapped to the UPSTREAM SENDING output of the downstream controller.

The control logic to tie the logic together for adjacent zones is straight-forward. If a ZoneLink™ Controller with a MAC ID of 8 is upstream of the ZoneLink™ Controller with a MAC ID of 9, the following two lines of ladder logic are all that is needed to handshake between the controllers:

Logic Diagram



Zone 1 is always the most upstream zone for accumulation logic, with the highest numbered automatic zone being the most downstream zone.

Within the **Zone Group Object (Class 102, Instance 1)** there are several attributes for configuring the accumulation capabilities of the ZoneLink™ Controller.

Release Mode [Attribute 17]

In Accumulation Mode, there are three methods for releasing product to the next zone.

Release Mode Values

Value	Release Mode
0	Singulation
1	Quick Release
2	Train

Singulation (Zero Pressure Accumulation) prevents material from being released to the next zone until that zone is completely clear.

Quick Release (Zero Pressure Accumulation) will begin transferring an item into the next zone as soon as the downstream zone begins to release product downstream.

Train (Low Pressure Accumulation) will allow a zone to run as long as the downstream zone is running. This is an effective mode for loading/unloading conveying systems with boxes of various sizes.

Jam Timer [Attribute 23]

When a product is released from a zone, the **Jam Timer** begins timing and, if it expires before the sensor is cleared, will set an input in the input variable declaring the jam fault. The zone will also discontinue running.

The Jam Timer value is in 100 millisecond increments (0.1 seconds), with a range of 0-25.5 seconds. The default value is 40 (4 seconds).

The Jam Timer is inactive if the ZoneLink™ Controller is in Manual Mode.

Transfer Timer [Attribute 24]

Once the material clears the upstream sensor in a zone the **Transfer Timer** begins timing. If the timer expires before the item reaches the downstream sensor the unit is deemed to be missing, and the zone is reset.

The Transfer Timer value is in 100 millisecond increments (0.1 seconds), with a range of 0-25.5 seconds. The default value is 40 (4 seconds).

The Transfer Timer is inactive if the ZoneLink™ Controller is in manual mode.

Gap Timer [Attribute 25]

The **Gap Timer** is used in Train Mode to maintain a gap between units.

The Gap Timer is inactive if the ZoneLink™ Controller is in manual mode.

Sleep Timer [Attribute 26]

The **Sleep Timer** is used to keep a zone running after the zone has cleared and no other units are waiting to be transported into the zone. This can reduce the amount of motor cycling in system.

The Sleep Timer value is in 0.1 second increments, with a range of 0 to 255 (0-25.2 seconds). The default value is 20 (2.0 seconds).

On-Delay Timer [Attribute 27]

The **On-Delay Timer** allows for a time delay to be implemented before a unit is released. This reduces mechanical wear and tear and power spikes caused by multiple zones starting simultaneously.

The On-Delay Timer value is in 10 millisecond increments (0.01 seconds), with a range of 0-2.55 seconds. The default value is 25 (250 milliseconds).

The On-Delay Timer is inactive if the ZoneLink™ Controller is in Manual Mode.

Force Accumulate

There are two methods for forcing a zone to accumulate, regardless of the logic. The first is for the host controller to turn on the Zone Accumulate Output bit for the specific zone. The second method is to enable an auxiliary input to be an external accumulate signal. This is done by turning on the Aux Input Accumulate Enable (Zone Control Object, Class 100, Instances 1-4, Attribute 8) for that zone. Note that each input is mapped directly to the corresponding zone (i.e. input 1 is for zone 1).

Warnings and Faults

**** * Applies Only to ZoneLink™.S * ****

ZoneLink™.S products that directly drive motors, such as Driver and ZPA Modules, are capable of monitoring the motor and the application. Two types of indications exist to report these conditions: Faults and Warnings.

Application and Critical Faults cause the motor to stop running, and may require intervention to return the system to operation.

Predictive Warnings describe a condition that suggests the motor should be replaced at the next available opportunity.

When a fault or warning condition exists, the Fault Line bit for that zone will be ON in the Input Variable. Further, the Zone Error Flag will be ON to indicate in which zone the condition occurred. Specific information about the condition is communicated by a **Zone Error Code (Assembly Object, defined in the ZoneLink™ Input Variable)** transmitted in Byte 4 of the Input Variable.

Once the Zone Error Code is reported, the code and the Zone Error Flag reset to default. Each individual Zone Error Code will not be reported again unless the condition is removed and then reappears. This allows for reporting multiple fault and warning conditions on each 4-Zone Controller. The Fault Line bit will remain on whenever an error condition exists.

The most recent unread Zone Error Code is also stored in the **Diagnostic Register (**ZoneLink™ Port Object**, Class 100, Instances 1-4, Attribute 17)**

If the zone experiences either a Fault or a Warning, the FAULT line on the ZoneLink™ port of the Driver or ZPA Module will also be activated, and the STATUS LED should be flashing. Consult the documentation for the Driver or ZPA Module for details.

Fault Register

Bit	Indication
0	Commutation Fault – the circuit that controls the motor commutation has failed.
1	Low Current – the Drive Module is reading a current that is below the normal No Load value. This is typically due to the mechanical link internal to the powered roller has broken. The remedy is to replace the roller.
2	Reserved
3	Work station hold activated – Not a true "fault." Indicates that an external signal has forced the roller to stop. Normally used to manually force accumulation.
4	Motor Stall – the motor has dropped below a low speed setting for a full second. The motor will attempt to start after a ten second delay.
5	Motor Thermistor Fault – the temperature inside the motor is too high. The motor will restart when the motor cools down.
6	Reserved
7	Driver Thermistor Fault – the temperature inside the driver electronics is too high. The motor will restart when the motor cools down.

Zone Error Code - Faults	
Hex Value	Description
0	Commutation Fault
1	Low Current Fault
2	Reserved
3	Work Station Hold
4	Motor Stall
5	Motor Thermistor Fault
6	Reserved
7	Driver Thermistor Fault

Warning Register

Bit	Indication
0	Excessive Current Limit – when the motor is running, every 10 milliseconds the current being consumed by the powered roller is measured. If more than 30% of the measurements are at the current limit level then a warning is activated.
1	High No Load Current – when a roller is instructed to stop and its sensor is not blocked then, prior to stopping, a current reading is taken and a moving average is calculated. If the moving average is greater than 0.7 amps, then a High No Load Current warning is issued. Note: No Load Current Enabled (Class 100, Instances 1-4, Attribute 22) must be set to 1 for this diagnostic to be active. This diagnostic is valid only in Singulation Mode.
2	Excessive Motor Stalls – each time the motor is stopped, the Motor Stall Fault is checked. If more than 10% of motor stops are due to a stall then a warning is activated.
3	Design Life – a Microroller™ has a design life of 25,000 hours. When the motor has run for more than the design life a warning is indicated.
4	Reserved
5	Reserved
6	Reserved
7	Reserved

Zone Error Code – Warning	
Hex value	Description
8	Excessive Current Limit
9	High No Load Current
A	Excessive Motor Stalls
B	Design Life
C	Reserved
D	Reserved
E	Reserved
F	Reserved

Host Controller

Input Variable

The Input Variable is contained in an **Assembly Object (Class 4, Instance 101).**

The Input Variable contains points from the following objects:

- **ZoneLink™ Port Object (Class 100, Instance 1-4)**
- **Discrete Input Object (Class 8, Instance 1-4)**
- **Zone Control Object (Class 101, Instance 1-4)**
- **Zone Group (Class 102, Instance 1)**

The Operating Mode selected (Zone Group Object, Attribute 16) and, if in Manual Mode, the ZoneLink™ port configuration (see ZoneLink™ Port Object) affects which inputs are active, as shown in the table to the right.

Input Point			Mode 0 - Manual			Mode 1 Accumulation
Byte	**Bit**	**Description**	**Type 0 Driver**	**Type 1 Upstream**	**Type 2 Downstream**	
0	0	ZoneLink™ Port 1 Sending*	X	X		X
	1	ZoneLink™ Port 1 Ready			X	
	2	ZoneLink™ Port 1 Direction			X	
	3	ZoneLink™ Port 1 Run			X	
	4	ZoneLink™ Port 1 Fault Line	X	X		X
	5	ZoneLink™ Port 1 Bypass			X	
	6	Reserved				
	7	Zone Error Flag	X	X		X
1	0	ZoneLink™ Port 2 Sending*	X	X		X
	1	ZoneLink™ Port 2 Ready			X	
	2	ZoneLink™ Port 2 Direction			X	
	3	ZoneLink™ Port 2 Run			X	
	4	ZoneLink™ Port 2 Fault Line	X	X		X
	5	ZoneLink™ Port 2 Bypass			X	
	6	Reserved				
	7	Zone Error Flag	X	X		X
2	0	ZoneLink™ Port 3 Sending*	X	X		X
	1	ZoneLink™ Port 3 Ready			X	
	2	ZoneLink™ Port 3 Direction			X	
	3	ZoneLink™ Port 3 Run			X	
	4	ZoneLink™ Port 3 Fault Line	X	X		X
	5	ZoneLink™ Port 3 Bypass			X	
	6	Reserved				
	7	Zone Error Flag	X	X		X
3	0	ZoneLink™ Port 4 Sending*	X	X		X
	1	ZoneLink™ Port 4 Ready			X	
	2	ZoneLink™ Port 4 Direction			X	
	3	ZoneLink™ Port 4 Run			X	
	4	ZoneLink™ Port 4 Fault Line	X	X		X
	5	ZoneLink™ Port 4 Bypass			X	
	6	Reserved				
	7	Zone Error Flag	X	X		X
4	0	Auxiliary Input 1	X	X	X	X
	1	Auxiliary Input 2	X	X	X	X
	2	Auxiliary Input 3	X	X	X	X
	3	Auxiliary Input 4	X	X	X	X
	4	Zone Error Code	X	X	X	X
	5	Zone Error Code	X	X	X	X
	6	Zone Error Code	X	X	X	X
	7	Zone Error Code	X	X	X	X
5	0	Zone 1 Jam				X
	1	Zone 2 Jam				X
	2	Zone 3 Jam				X
	3	Zone 4 Jam				X
	4	Upstream Ready Signal				X
	5	Downstream Sending Signal				X
	6					
	7					

* When connected to a ZoneLink™ Driver Module (Manual Mode, Port Type Driver Module or Accumulation Mode) the Sending line carries the state of the sensor that is wired to the Driver Module.

Host Controller

Output Variable

The Output Variable is contained in an **Assembly Object (Class 4, Instance 102).**

The Output Variable contains points from the following objects:

- **ZoneLink™ Port Object (Class 100, Instance 1-4)**
- **Discrete Input Object (Class 8, Instance 1-4)**
- **Zone Control Object (Class 101, Instance 1-4)**
- **Zone Group (Class 102, Instance 1)**

The Operating Mode selected (Zone Group Object, Attribute 16) and, if in manual mode, the ZoneLink™ port configuration (see ZoneLink™ Port Object) affects which outputs are active, as shown in the table to the right.

Output Point			Operating Mode 0 [Manual]			Operating Mode 1 [ZPA]
Byte	Bit	Description	Type 0 Driver	Type 1 Upstream	Type 2 Downstream	
0	0	ZoneLink™ Port 1 Sending			X	
	1	ZoneLink™ Port 1 Ready		X		
	2	ZoneLink™ Port 1 Direction	X	X		X
	3	ZoneLink™ Port 1 Run	X	X		X
	4	ZoneLink™ Port 1 Fault			X	
	5	ZoneLink™ Port 1 Bypass	X	X		X
	6					
	7	ZoneLink™ Port 1 Reset	X			X
1	0	ZoneLink™ Port 2 Sending			X	
	1	ZoneLink™ Port 2 Ready		X		
	2	ZoneLink™ Port 2 Direction	X	X		X
	3	ZoneLink™ Port 2 Run	X	X		X
	4	ZoneLink™ Port 2 Fault			X	
	5	ZoneLink™ Port 2 Bypass	X	X		X
	6					
	7	ZoneLink™ Port 2 Reset	X			X
2	0	ZoneLink™ Port 3 Sending			X	
	1	ZoneLink™ Port 3 Ready		X		
	2	ZoneLink™ Port 3 Direction	X	X		X
	3	ZoneLink™ Port 3 Run	X	X		X
	4	ZoneLink™ Port 3 Fault			X	
	5	ZoneLink™ Port 3 Bypass	X	X		X
	6					
	7	ZoneLink™ Port 3 Reset	X			X
3	0	ZoneLink™ Port 4 Sending			X	
	1	ZoneLink™ Port 4 Ready		X		
	2	ZoneLink™ Port 4 Direction	X	X		X
	3	ZoneLink™ Port 4 Run	X	X		X
	4	ZoneLink™ Port 4 Fault			X	
	5	ZoneLink™ Port 4 Bypass	X	X		X
	6					
	7	ZoneLink™ Port 4 Reset	X			X
4	0	Auxiliary Output 1	X	X	X	X
	1	Auxiliary Output 2	X	X	X	X
	2					
	3					
	4	Manual Override				X
	5					
	6					
	7					
5	0	Zone 1 Accumulate				X
	1	Zone 2 Accumulate				X
	2	Zone 3 Accumulate				X
	3	Zone 4 Accumulate				X
	4	Downstream Ready Signal				X
	5	Upstream Sending Signal				X
	6					
	7					

Common Services

Common Services are explicit messaging services for DeviceNet™ with request/response parameters and a defined behavior.

Not all Common Services are supported in every object.

Service Code	Service Name	Description
5 (05_{hex})	Reset	Invokes the reset service for the device. Request data includes the object, instance and a single parameter.
14 ($0E_{hex}$)	Get_Attribute_Single	Returns the value of a specific attribute within an object. Request data includes the object, instance and attribute number.
16 (10_{hex})	Set_Attribute_Single	Modifies the value of an attribute within an object that is defined with GET/SET access. Request data includes the object, instance, attribute number and the new value.

Object Definitions

Identity Object

Class 1, Instance 1

The Identity Object provides status and general information about a device. The Identity Object is required in all DeviceNet™ products.

Attribute	Description	Data Type	R/W	Default Value
1	Vendor ID	INTEGER	R	693
2	Device Type	INTEGER	R	100 [Vendor-Specific]
3	Product Code	INTEGER	R	
4	Revision	BYTE [2]	R	1,1
5	Status	WORD	R	
6	Serial Number	LONG INT	R	
7	Product Name	CHAR	R	Powered Roller Controller

Attribute 5 - Status

Bit	Name	Bit Meaning	
		0	1
0	Owned	Not Owned	Allocated
1	Reserved		
2	Configured		
3	Reserved		
4	I/O Power	Not Present	Present
5	Reserved		
6	Reserved		
7	Reserved		
8	Minor Recoverable Fault	No Fault	Fault
9	Minor Unrecoverable Fault	No Fault	Fault
10	Major Recoverable Fault	No Fault	Fault
11	Major Unrecoverable Fault	No Fault	Fault
12	Reserved		
13	Reserved		
14	Reserved		
15	Reserved		

DeviceNet Object

Class 3, Instance 1

Attribute	Description	Data Type	Access	Default Value
1	MAC ID (0-63)	BYTE	Get/Set	63
2	Baud Rate	BYTE	Get/Set	0 (125K)
3	BOI	BOOLEAN	Get/Set	1
4	Bus-Off Counter	BYTE	Get/Set	
5	Allocation Information	BYTE [2]	Get	

Connection Object

Class 5, Instances 1, 2 and 4

Instance 1 – Polled I/O
Instance 2 – Explicit Messaging
Instance 4 – Change of State I/O

Note:
Instance 3 – Strobed I/O not supported

Attribute	Description	Data Type	Access	Default Value
1	State	BYTE	Get	
2	Instance Type	BYTE	Get	
3	Transport Class Trigger	BYTE	Get	
4	Produced Connection ID	BYTE	Get	
5	Consumed Connection ID	BYTE	Get	
6	Initial Comm Characteristics	BYTE	Get	
7	Produced Connection Size	UINT	Get	
8	Consumed Connection Size	UINT	Get	
9	Expected Packet Rate	UINT	Get/Set	
12	Watchdog Timeout Action	BYTE	Get/Set	
13	Produced Connection Path Length	UINT	Get	
14	Produced Connection Path		Get	
15	Consumed Connection Path Length	UINT	Get	
16	Consumed Connection Path		Get	

Assembly Object

Class 4, Instance 101 (Inputs)
Class 4, Instance 102 (Outputs)

Attribute	Description	Description
3	Input Variable	See the section on Input Variable for mapping
3	Output Variable	See the section on Output Variable for mapping

Digital Input Object

Class 8, Instances 1-4

The Digital Input Object is for configuring and reading the state of the Auxiliary Inputs on the ZoneLink™ Controller.

Attribute	Description	Data Type	Access	Default Value
3	Input State	BOOLEAN	Get	
100	Input NO/NC	BOOLEAN	Get/Set	0

Digital Output Object

Class 9, Instances 1-2

The Digital Output Object is for configuring and controlling the Auxiliary Outputs on the ZoneLink™ Controller.

Attribute	Description	Data Type	Access	Default Value
3	Output State	BOOLEAN	Get/Set	0
5	Fault State	BOOLEAN	Get/Set	0
6	Fault Value	BOOLEAN	Get/Set	0
7	Idle State	BOOLEAN	Get/Set	0
8	Idle Value	BOOLEAN	Get/Set	0

ZoneLink™ Port Object

Class 100, Instances 1-4

Instances align with port number (Instance 1 > Port 1, etc.).

Attribute	Description	Data Type	Access	Default Value
3	ZoneLink Port Input States	BYTE	Get	0
4	ZoneLink Port Output States	BYTE	Get/Set	0
9	Port Type	BYTE	Get/Set	0 [Driver]
10	Node Index	BYTE	Get/Set	0 [Ignored if Zone Port Type = 0]
12	Run Speed	WORD	Get/Set	1800 [RPM]
13	Bypass Speed	WORD	Get/Set	2400 [RPM]
17	Diagnostic Register	WORD	Get	
19	Enable No Load Current	BOOLEAN	Get/Set	0 [Disabled]

Zone Control Object

Class 101, Instances 1-4

Instances align with port number (Instance 1 > Port 1, etc.).

Attribute	Description	Data Type	Access	Default Value
4	Zone Accumulate	BOOLEAN	Get/Set	0
5	Jam State	BOOLEAN	Get	0
8	Aux Input Accumulate Enable	BOOLEAN	Get/Set	0 [Disabled]

Zone Group Object

Class 102, Instances 1

Attribute	Description	Data Type	Access	Default Value
3	Downstream Ready State	BOOLEAN	Get/Set	0
4	Upstream Sending State	BOOLEAN	Get/Set	0
5	Upstream Ready State	BOOLEAN	Get	
6	Downstream Sending State	BOOLEAN	Get	
16	Operating Mode	BYTE	Get/Set	0 [Manual Mode]
17	Release Mode	BYTE	Get/Set	0 [Singulation]
18	Number of Automatic Zones	BYTE	Get/Set	4
19	Manual Override	BOOLEAN	Get/Set	0
23	Jam Timer	BYTE	Get/Set	80 [8 seconds]
24	Transfer Timer	BYTE	Get/Set	40 [4 seconds]
25	Gap Timer	BYTE	Get/Set	25 [250 milliseconds]
26	Sleep Timer	BYTE	Get/Set	20 [2 seconds]
27	On Delay Timer	BYTE	Get/Set	25 [250 milliseconds]

Zone Error Codes

ZL.S-DK101/2

Zone Error Code - Faults		Zone Error Code – Warning	
Hex Value	Description	Hex value	Description
0	Commutation Fault	8	Excessive Current Limit
1	Low Current Fault	9	High No Load Current
2	Reserved	A	Excessive Motor Stalls
3	Work Station Hold	B	Design Life
4	Motor Stall	C	Reserved
5	Motor Thermistor Fault	D	Reserved
6	Reserved	E	Reserved
7	Driver Thermistor Fault	F	Reserved

Note: The Zone Error Code Value is relevant only when a Fault/Warning (See Host Controller Input Variable) bit is active.