ZoneLink®.S Serial Interface Module

For use with ZoneLink®.S Modules

ZLF-6610-0 1205 TECHNICAL DATA SHEET

Description

ZoneLink® is Holjeron's proprietary control protocol developed to leverage off-the-shelf Cat 5 LAN cable to control a brushless DC motor driven roller. One facet of ZoneLink® is serial command and control protocol called .S. (dot S.)

The ZoneLink®.S protocol uses a serial link to:

- Monitor predictive diagnostics embedded in the Driver Module to flag when a powered roller should be replaced, in advance of the roller failing.
- Set line speed either individually or globally across up to 255 zones.

The ZL.S-F32 enables a Windows-based computer to monitor and communicate a .S network using the computer's serial (RS232) port.

Specifications

Part Numbers	ZoneLink®.S to Serial Interface		ZL.S-F32
Electrical	Termination		Plug-In, Spring Clamp Terminal
Power	Voltage Range		24 VDC
Serial Port	Type		RS232
	Number		1
	Data bits		8
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
Dimensions			3.34" x 1.4" x ___
Weight			X
Terminations	ZoneLink®		RJ45
	Serial		DB9

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® 4 Zone Controllers with DeviceNet™

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

Contact us

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About Holjeron

Our products are all 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

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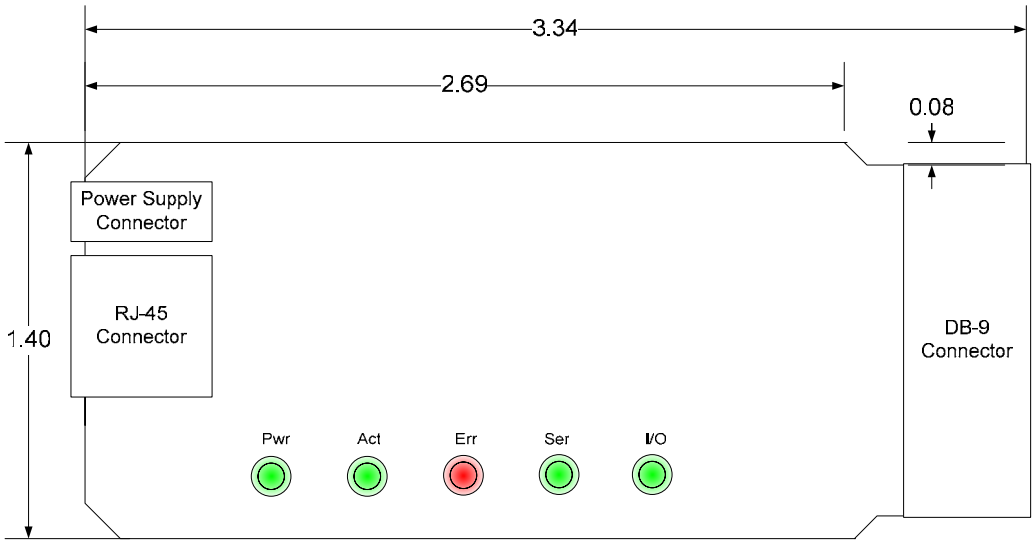
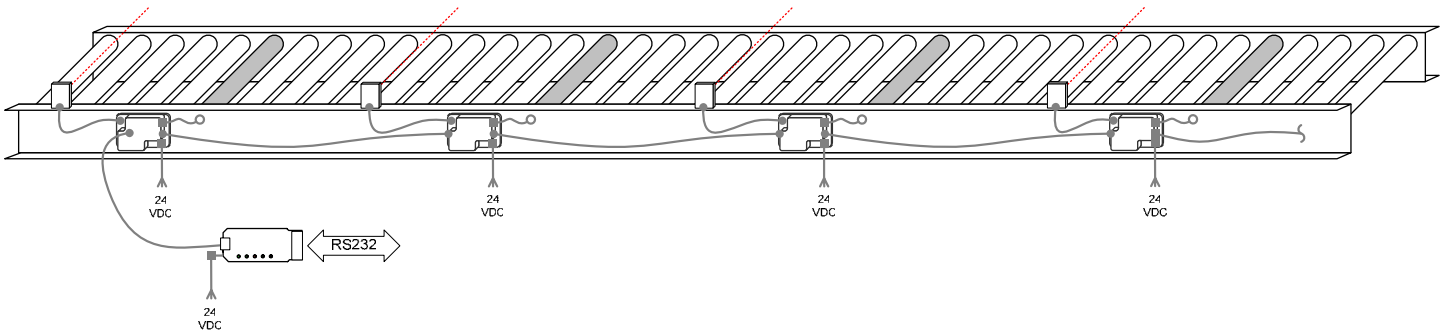
Dimensions and Layout



Typical Installation



Wiring

24 VDC Power

There are 5 LEDs. In order from the RJ-45 (Zonelink) to DB9 (RS-232) they are:

GREEN – POWER – Glows solid when power is applied and unit is not in RESET

GREEN – ACTIVITY – Flashes during Zonelink signal activity (or maybe just .S Tx activity)? (TDB)

RED – ERROR – Process Error state (flashing at stead rate during error state, off if no error) (Rate TDB)

GREEN – SERIAL – Flashes during RS-233 activity? (TDB…maybe just during RS232 Tx)

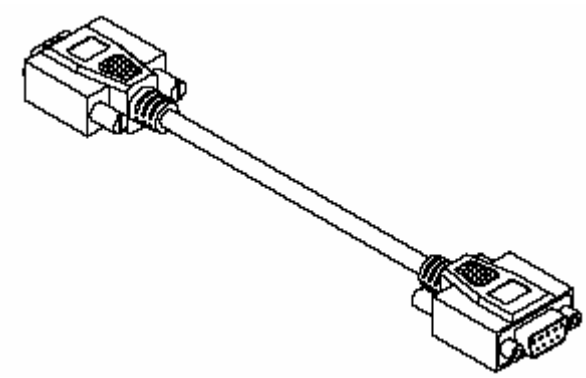
GREEN – I/O Power – Glows solid when the isolation power supply for the RS232 interface is on.

Configuration

Configuration over .S requires a computer with an ASCII compiler and an RS232 serial port with a DB9 connector.

Accessories

Extension cable



Software Interface

System Requirements

TBD

Description

The ZL.S-F32 allows you to control and monitor operational parameters of a ZoneLink® system. A detailed discussion of the ZoneLink .S protocol can be found in the section entitled **ZoneLink®.S Protocol.**

Installation instructions

TBD

Graphic User Interface

TBD

ZoneLink®.S Protocol

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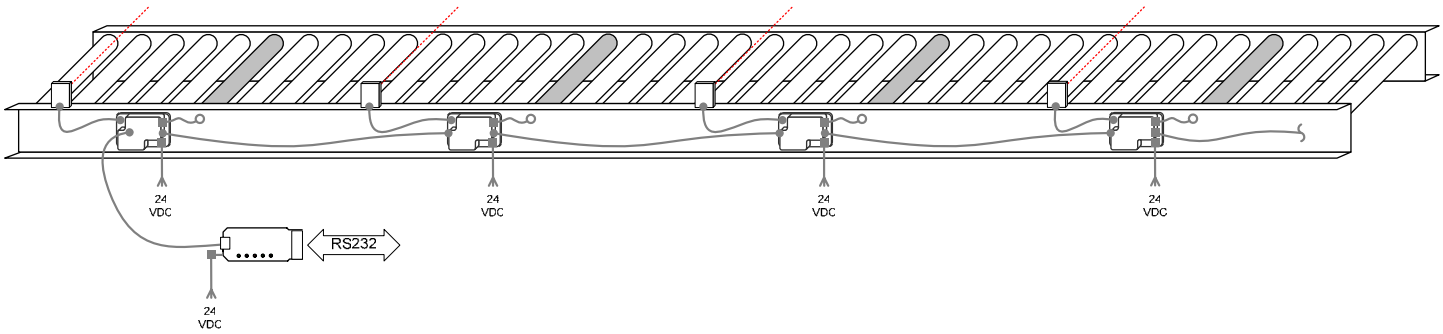
Summary

ZoneLink® is Holjeron's architecture for connecting control components in a conveyor system using readily available RJ-45/Category 5 patch cables. ZoneLink®.S refers to products that support a one-wire serial communications protocol over one of the pins on the category 5 cable. The ".S" technology is not meant for real-time control. Instead, it's intended for product configuration and fault reporting.

".S" products reduce installation time and improve system up-time. For example, instead of setting a speed pot on every motorized roller a global speed command can be generated at the discharge end of a line and all units on the line will automatically be configured for that speed. This significantly reduces setup time. Up-time can be improved through a series of predictive warnings regarding the state of the motor. A roller can be replaced at the next available opportunity, preventing a motor failure from causing down time.

The ".S" protocol supports local and global commands. A local command is for configuring an individual unit, while global commands are meant for two or more units on a system. A useful way to use the feature is to configure an entire line with global commands, then configure individual units that need to behave differently using local commands. For example, the last portion of a line may need to run faster than the rest of the line to increase a gap between products on the line. Those units in the zones that need to run faster can be configured locally to give them a higher speed.

ZoneLink® Motor-Driven Roller System



Connector Specifications

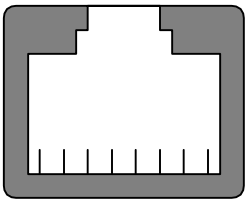
ZPA applications require both upstream and downstream connections in a zone controller. ZoneLink® defines the pinouts and functions for both connectors. Within ZoneLink®, a connector that is labeled UPSTREAM is mated to a connector labeled DOWNSTREAM, and vice versa. The signal direction (input or output) varies depending on whether a connector is UPSTREAM or DOWNSTREAM.

A third type of port, a MASTER, is used to interface to a zone controller. A MASTER port typically connects to a DOWNSTREAM port in a system.

ZoneLink® Pin Assignments

ZoneLink® connectors are presently defined as RJ-45 connectors, with the pin assignments based on T568B standards. The function of each pin depends on the type of ZoneLink® port, as shown in the table below.

RJ-45 Female Connector



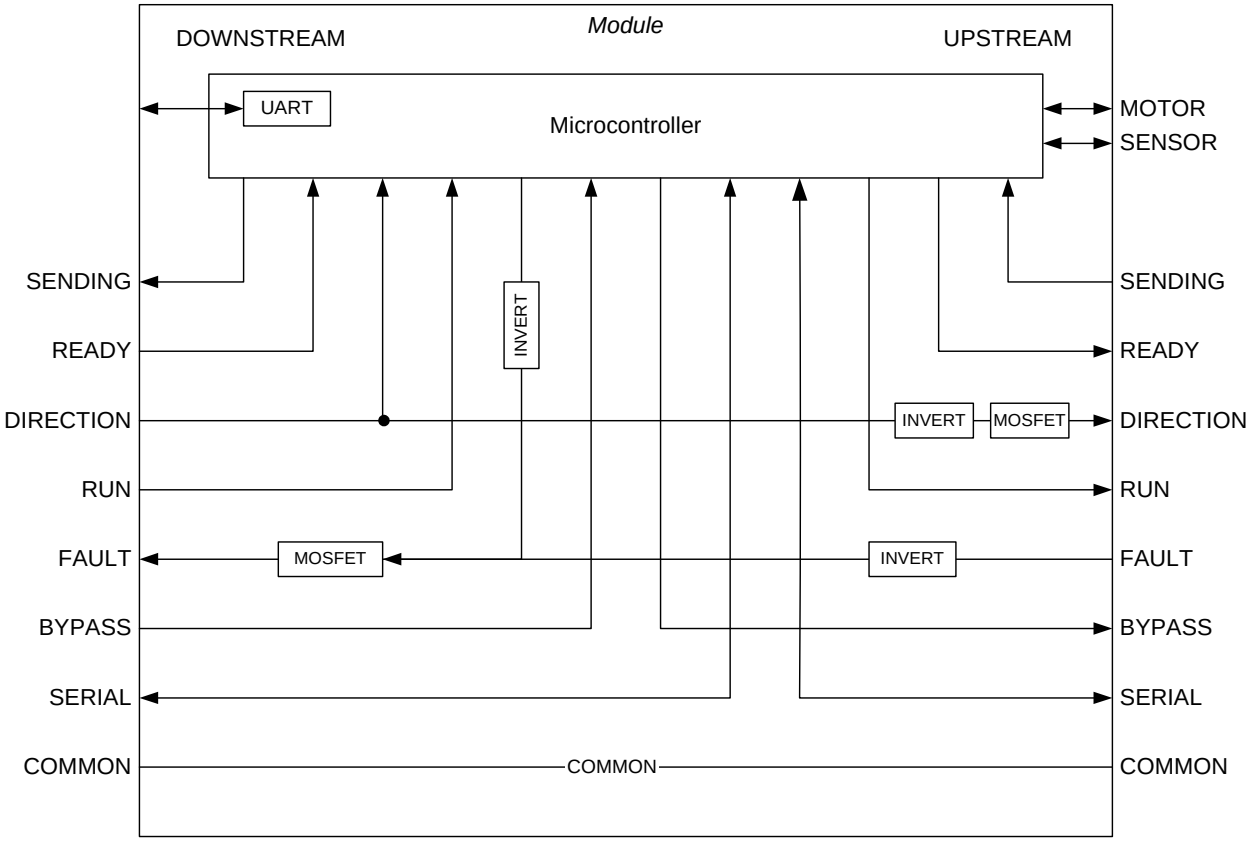
ZoneLink® Port Pin Assignments

Pin	Description	Downstream Port	Upstream Port	Master Port
1	SENDING/Photo	OUTPUT	INPUT	INPUT/OUTPUT
2	READY (1)	INPUT	OUTPUT	OUTPUT/INPUT
3	DIRECTION	GLOBAL INPUT		OUTPUT
4	RUN	INPUT	OUTPUT	OUTPUT
5	FAULT	OUTPUT	INPUT	INPUT
6	BYPASS (2)	INPUT	OUTPUT	OUTPUT (Source)
7	SERIAL (.S Only)	INPUT	OUTPUT	OUTPUT (Source)
8	SIGNAL COMMON	---		

(1) The READY line may be a bi-directional line, depending on whether a ZoneLink® product supports reversing accumulation.

(2) In a ZPA Module, when BYPASS is taken to COMMON all zones will immediately stop, regardless of their logic state. When in BYPASS, pulling the RUN to COMMON will execute a SLUG RELEASE. Releasing the BYPASS line will cause a SYTEM RESET. ZoneLink®.S units will also run at a BYPASS SPEED.

ZoneLink® Block Diagram



Note: Serial is for ZoneLink®.S only.

Protocol Structure

The .S protocol is defined by a binary structure that is compatible with one-wire serial communications. It is based on service request/response message packets, and supports both single-unit and multi-unit service request.

All .S messages contain a minimum of three (3) header bytes, followed by up to thirty-one (31) data bytes. The majority of service requests and response, however, will contain only a few data bytes, and some won't have any.

Header Bytes

INDEX		
SERVICE	VARIABLE ID	
REQ/RESP	RESERVED	DATA LENGTH (N Bytes)

Data Bytes

DATA BYTE 1
DATA BYTE 2
⋮
DATA BYTE N

INDEX

The ZoneLink® product for which the message is intended, defined as the number of units upstream from the one that is connected to a ZoneLink®.S master. A message intended for the product directly connected to would be INDEX 0, the next upstream INDEX 1, etc. Except for MULT-UNIT REQUESTS where INDEX is set to 255 (see below), if INDEX is less than 255 and greater than 0, then the ZoneLink®.S unit will decrement the INDEX and re-transmit the message upstream.

If the REQUEST is MULTI-UNIT, then the INDEX is the N-1 number of units to receive the message (INDEX = 5 means 6 units will receive the message), except when INDEX =255. In this case, the INDEX is never decremented, and all ZoneLink products pass the message upstream. Thus, a MULTI-UNIT REQUEST with INDEX = 255 is a GLOBAL REQUEST.

SERVICE

There are three defined services: SET PROPERTY, GET PROPERTY, and METHOD.

0 0	SET PROPERTY
0 1	GET PROPERTY
1 0	METHOD
1 1	RESERVED

VARIABLE ID

The property being read or written, or the action to be executed. See the section on ZoneLink®.S Properties and Actions.

REQ/RSP

The REQUEST/RESPONSE field is to define the direction of the message. There are four (4) possibilities for this field: SINGLE UNIT REQUEST, MULTI-UNIT REQUEST, SINGLE UNIT RESPONSE, and SINGLE UNIT RESPONSE ERROR.

0 0	Single Unit Request
0 1	Multi-Unit Request
1 0	Single Unit Response
1 1	Single Unit Error Response

A Single Unit Response will contain data relative to the request. For example, a request to read a property value will result in the data being included in the response message.

An error response will contain a single data byte, which will be an error code from the table below:

Error Code	Description
1	Invalid Service Request
2	Invalid Variable ID
3	Read Only Property
4	Invalid Data Length
5	Data Out of Range
6	EEPROM Error
7 – 255	Reserved

DATA LENGTH

The number of data bytes (0…31) in the message.

ASCII .S Conversion

The ASCII .S conversion commands are used with ZoneLink® .S Interface units. Interface units are an easy way to configure and control ZoneLink® .S Properties and Actions, as well as ZPA logic signals, from any terminal or terminal emulation device (such as a PC or PDA with terminal software) which have a RS-232 port configured to 9600bps with 8 data bits, 1 start bit, 1 stop bit, and no parity (9600-8N1).

.S Interface Commands

xPn?<CR>	Reads property n from unit x and returns value v. (Read operations are single unit only.)
Pn?<CR>	Reads property n from unit 0 and returns value v. (Read operations are single unit only.)
*Pn=y<CR>	Writes value y to property n on all units and returns status code.
*xPn=y<CR>	Writes value y to property n on units 0 through x and returns status code.
xPn=y<CR>	Writes value y to property n on unit x only and returns status code.
Pn=y<CR>	Writes value y to property n on unit 0 only and returns status code.
*An<CR>	Requests Action n on all units and returns status code.
*xAn<CR>	Requests Action n on units 0 through x and returns status code.
xAn<CR>	Requests Action n on unit x only and returns status code.
An<CR>	Requests Action n on unit 0 only and returns status code.

Miscellaneous Commands

HELP<CR> -or- ?<CR>	Returns brief ZoneLink® .S Interface command protocol summary.
<CR>	Carriage Return (ASCII 13) is used to terminate all commands and responses.

Return Status Codes

(command string)>v<CR>	Read command successfully returned number or string v.
(command string)>xxxxxx<CR>	Read command successfully returned 6 character binary string.
Example:	`$P10?>010001<CR>` Shows the 5th and 1st bits are activated.
(command string)>OK<CR>	Write command was successfully accepted and acknowledged.
(command string)>OK<CR>	Multiple unit command was successfully accepted and sent.
(command string)>ErrorN<CR>	Command was not successful for reason N.

Error	Description
0	Syntax Error – Command not processed
1	Invalid Service Request
2	Invalid Variable ID
3	Read Only Property
4	Invalid Data Length
5	Data Out of Range
6	EEPROM Error
7 – 255	Reserved

Zonelink .S Interface Commands

$As<CR> Request Action s on the ZoneLink® .S Interface.

Action	Description
0	Restore to Out of Box Condition
1	Set all ZoneLink® Outputs to mirror Inputs
2-31	Reserved

$Ps?<CR> Returns the value for property s of the ZoneLink® .S Interface.

$Ps=v<CR> Writes value or string v to property s on the ZoneLink® .S Interface.

Property	Description	Type	DATA
0	Device Name / Model	Read Only	String
1	Hardware Version	Read Only	String
2	Software Version	Read Only	String
3-9	Reserved		
10	ZoneLink® Outputs (See chart below)	Read/Write	6 Char. Binary String
11	RUN ZoneLink® Upstream mirrors Downstream	Read/Write	1=Set 0=Clear
12	DIR ZoneLink® Upstream mirrors Downstream	Read/Write	1=Set 0=Clear
13	BYP ZoneLink® Upstream mirrors Downstream	Read/Write	1=Set 0=Clear
14	CTS ZoneLink® Upstream mirrors Downstream	Read/Write	1=Set 0=Clear
15	SND ZoneLink® Downstream mirrors Upstream	Read/Write	1=Set 0=Clear
16	FLT ZoneLink® Downstream mirrors Upstream	Read/Write	1=Set 0=Clear
17	ZoneLink® Upstream Signal Status (See chart below)	Read Only	6 Char. Binary String
18	ZoneLink® Downstream Signal Status (See chart below)	Read Only	6 Char. Binary String
19-31	Reserved		

$Us?<CR> Reads Upstream ZoneLink® signal s state and returns value or string.

$Us=b<CR> Writes Upstream ZoneLink® signal s to state b and returns status code.
NOTE: Only valid for RUN, DIR, BYP, and CTS.
Us=0 Signal Inactive (floating high)
Us=1 Signal Activated (pulled low)

$Ds?<CR> Reads Downstream ZoneLink® signal s state and returns value v or string.

$Ds=b<CR> Writes Downstream ZoneLink® signal s to state b and returns status code.
NOTE: Only valid for SND and FLT.
Ds=0 Signal Inactive (floating high)
Ds=1 Signal Activated (pulled low)

Signal s	Bit Number	Zonelink Signal	Upstream Port	Downstream Port
RUN	1 – Far Right	Run	Output	Input
DIR	2	Direction	Output	Input
BYP	3	Bypass	Output	Input
CTS	4	Clear-To-Send (Ready)	Output	Input
SND	5	Sending	Input	Output
FLT	6 – Far Left	Fault	Input	Output
ALL -Read Only	All 6 Above	All 6 Above	All 6 above	All 6 above

ZoneLink®.S Product Modeling

The following defines all the properties and actions that might exist in a ZoneLink®.S product. Note that an individual product may not support all items. For example, a ZoneLink®.S Driver Module would not support timers used in Zero Pressure Accumulation. Conversely, a ZPA Module that doesn't directly drive a motorized roller would not have all the motor-related properties.

ZoneLink®.S Properties

A .S property is some value associated with the product. It could be some configuration value we set such as the speed setpoint, or it could be some data value we read back such as the motor temp. Write properties can be adjusted using a PC with a serial (RS232) port and a ZL.S-F32 serial interface. The values can be set as integers from 1-255. For example, to change the jam timer value to 16 seconds, the customer could use his/her PC, the commands outlined in the section entitled "ASCII .S Conversion" and the ZL.S-F32 ZoneLink® Serial Interface to write the value "160" to .S property ID 32. To change the gap timer to 1.5 seconds, the customer would write "150" to .S property ID 36. These values can be customized to individual ZPA modules or set globally on up to 255 ZPA modules simultaneously.

Product Information (Required in all products)

ID	Description	R/W	Data Type	Range	Default/Notes
0	Product ID	R	Uns Byte	0…255	4 = 22 Watt 5 = 35 Watt 6-7 = Reserved
1	Hardware Version	R	Uns Byte		
2	Software Version	R	Byte [3]		
3-5	Reserved				
7	Fault/Warning Register (Current)	R	Uns Word	00-15	See Fault/Warning Register
8	Fault/Warning Register (Locked)	R	Uns Word	00-15	See Fault/Warning Register

Fault/Warning Register

Reserved 15	Reserved 14	Reserved 13	Reserved 12	Motor Design Life Exceeded 11	Excessive Motor Stalls 10	High No Load Current 09	Excessive Current Limit 08
Driver Thermistor Fault 07	Reserved 06	Motor Stalled 05	Motor Thermistor Fault 04	Work Station Hold Engaged 03	Reserved 02	Low Current 01	Commutation Fault 00

Sensor Properties

ID	Description	R/W	Data Type	Range	Default/Notes
8-15	Reserved				

Motor Properties

ID	Description	R/W	Data Type	Range	Default/Notes
16	Motor RPS	R			
17	Normal Speed Setpoint	W			1800

18	Bypass (w/Run) Speed Setpoint	W			2400
19	Bypass (wo/Run) Speed Setpoint	W			
20	Current Setpoint	W			22W: 2000 = 2 amp 35W: 2800 = 2.8 amp
21	Reserved				
22	No-Load Current Enable	W			0 = No-load current not enabled
23	Motor Current	R			
24	Motor Temperature	R			
25-28	Reserved				
29	Operating Time	R			
30	Reserved				

.S Properties

ID	Description	R/W	Data Type	Range	Default/Notes
31	Control Mode	W			0 (singulation) (CFG2 ON)
32	Jam Timer	W		0-255	80 (8 sec)
33	Transfer Timer	W		0-255	40 (4 sec)
34	Gap Timer	W		0-255	15 (150 msec)
35	Sleep Timer	W		0-255	20 (2 sec)
36	Release Timer	W		0-255	25 (250 msec)
37-63	Reserved				

ZoneLink®.S Actions

Required Actions

ID	Description	Notes
0	Clear Test Mode	
1	Set Test Mode	
2	Reserved	
3	Reserved	
4	Reset Driver	Reset diagnostic information (such as operating time when a motor is replaced)
5-15	Reserved	

ID	Description	Request Data	Response Data	Notes
16-31	Reserved			

ZPA Actions

ID	Description	Request Data	Response Data	Notes
32-63	Reserved			