ZoneLink®.S Configuration Guide

For Use with ZoneLink®.S Interface Tools and ZoneLink®.S enabled control products.
APPLICATION INSTRUCTIONS

Document Date: 6/15/2018

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 the serial command and control protocol called ZoneLink®.S. The ZoneLink®.S protocol uses a serial link to:

- Monitor faults enabling predictive diagnostics for each component in the system.
- Set line speed either individually or globally across up to 255 zones.
- Configure several other parameters.

The ZoneLink®.S protocol used in conjunction with the ZL.S-F32 ZoneLink® Serial Interface Module or the ZTC-F64 Multi-protocol Configuration Tool enables monitoring and communication with a ZoneLink®.S network using a PC or other device with a serial or USB port.

The protocol can be accessed using either the ZoneLink®.S Interface GUI software, or by using ZoneLink®.S ASCII Commands via a terminal emulator.

Interface tools:

Description	Part Number
ZoneLink®.S Serial Interface Module	ZL.S-F32 (Please Note: This product is no longer available and has been replaced by the ZTC-F64-DOTS)
F64 Multi-Protocol Configuration Tool - ZoneLink®.S Kit	ZTC-F64-DOTS

Please refer to the datasheet for the interface tool you are using for specifications and instructions on usage, indicators, and connections.

F64 Multi-Protocol Configuration Tool - ZoneLink®.S Kit (ZTC-F64-DOTS)

Please Note: If you intend to use the ZTC-F64 tool with both ZoneLink®.S and ZoneLink® TC installations, care must be taken to connect the device to the appropriate network.

- **Connecting the ZoneLink®.S port to a ZoneLink® TC or SDS bus will result in damage to the F64 Multi-Configuration Tool.**
- **Connecting the ZoneLink® TC / SDS Port to a ZoneLink®.S bus using the DB9-Cat 5 Adapter may result in damage to devices on the Dot S bus.**

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Summary

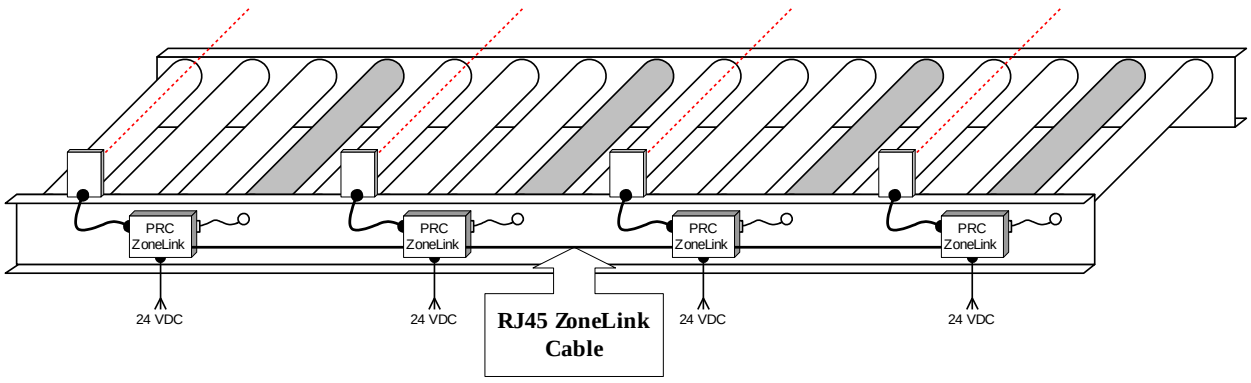
ZoneLink® is Holjeron's architecture for connecting control components in a conveyor system using readily available RJ-45/Cat 5 patch cables. ZoneLink®.S refers to products that support a one-wire serial communications protocol over one of the pins on the Cat 5 cable. The ZoneLink®.S technology is not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

ZoneLink®.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 (or downstream) end of a line and all units on the line will automatically be configured for that speed. This significantly reduces setup time. Uptime can be improved through a series of predictive warnings regarding the state of the motor or driver card. Components can then be replaced at the next available opportunity, preventing a motor failure from causing downtime.

The ZoneLink®.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.

There are two methods for configuring and monitoring ZoneLink®.S installations: Using a terminal or terminal emulator and ZoneLink®.S ASCII Commands, or using the ZoneLink®.S Interface GUI software available for download at www.holjeron.com/support. Both methods are explained in this document.

ZoneLink® Powered Roller System



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ZoneLink®.S Product Modeling

ZoneLink®.S Properties

A ZoneLink®.S property is some value associated with the product. It could be a configurable value such as the speed setpoint, or it could be a read-only diagnostic value such as the motor temp. Configurable properties can be written using a PC with a serial USB port and a ZTC-F64 Multi Configuration Tool or 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, use the commands outlined in the ZoneLink®.S Interface Commands section of this document and the ZTC-F64 ZoneLink® Multi-protocol Configuration Tool in ZoneLink®.S mode to write the value "160" to ZoneLink®.S property ID 32.

Another way to go about this would be to enter "160" in the field for ZoneLink®.S property ID 32 using the Dot-S Interface GUI Software, as outlined in the ZoneLink®.S Interface GUI section of this document.

These tools enable configuration of individual modules, or global configuration on up to 255 connected modules simultaneously.

The sample table on the following page defines several of the properties and actions that may be available in a ZoneLink®.S product, in this case the AK121 and AH122 Zero Pressure Accumulation motor driven roller control modules. Note that all products may not support all items. Please refer to the Technical Data Sheet for the specific product you are using for the applicable table of properties.

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Sample ZoneLink® Attribute Table (Example: AK121/AH122)

Attribute #	Attribute Name	Description/Notes	Type	Units	Default	Range
0	Product code		Byte	-		N/A
1	Input variable		4 Bytes	-		N/A
2	Output variable		4 Bytes	-		N/A
4	Motor serial number	Smartroller E^2 only.				
7	Faults and warnings	Diagnostic Register - Instantaneous	2 Bytes	-		N/A
8	Faults and warnings	Diagnostic Register - Locked	2 Bytes	-		N/A
10	Catalog listing		Bytes	-		N/A
11	Software Version					
13	Motor power	22W/35W				
14	Motor poles				4	
16	Motor RPS	Revolutions per second/*60 for RPM	Word	RPS		N/A
17	Normal speed setpoint		Word	RPM	1800	1 - 10000
18	Override/Bypass speed set-point		Word	RPM	2400	1 - 10000
20	Current setpoint	2.6A 22W / 3.6A 35W	Word	mA	2600/3600	1 – 8000
21	Boosted current setpoint	3.4A 22W / 4.7A 35W	Word	mA	3400/4700	1 - 8000
22	Startup Transfer Enable	'Seek' on power up. Default is Disabled	Byte		0	0-1
23	Motor current		Word	mA		N/A
24	Motor temperature	'Motor Thermistor Fault' in the Fault Table	Word	0.1C		N/A
25	FET temperature	'Controller Thermistor Fault' in the Fault Table	Word	0.1C		N/A
26	Acceleration rate	600 (RPM/10ms)	Word	RPM/*	600	1 - 8000
27	Deceleration rate	900 (RPM/10ms)	Word	RPM/*	3600	1 - 8000
29	Operating time	'Design Life' in the Warning Table	Word	Hrs	0	N/A
31	Control mode	0-Singulation /1-Train/2-Slave/3-Manual	Byte	-	0	0 – 3
32	Jam timer		Byte	0.1S	80	1 – 255
33	Transfer timer		Byte	0.1S	40	1 – 255
34	Gap timer		Byte	10mS	15	1 – 255
35	Sleep timer		Byte	0.1S	20	0 – 255
36	Release timer		Byte	10mS	25	0 – 255
42	Hold Timer		Byte	0.1S	40	0 – 255
43	Supply Voltage	'Low Supply Voltage' in the Fault Table	Word	0.1V		N/A
49	Max % current limit		Word	%*100	8000	1 - 10000
50	Max % stalled		Word	%*100	1000	1 - 10000
51	Max no-load current		Word	mA	700	1 - 5000
52	Operating life		Word	Hrs	25000	1 - 40000
56	Min motor temp		Word	0.1C		
57	Max motor temp		Word	0.1C		
60	Line speed setpoint	SmartRoller E^2 only.	Word	Ft/Min		1 - 1000
61	Line speed	SmartRoller E^2 only.	Word	Ft/Min		
62	Minimum sensor current	0 = Disabled 'Photosensor Missing' in the Fault Table	Byte	0.1mA	50	0-255

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Hardware Details:

Connector Specifications

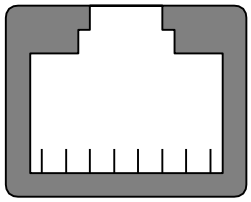
Zero Pressure Accumulation (ZPA) applications require both upstream and downstream connections in a zone controller. ZoneLink® defines the pinouts and functions for both connectors. Between ZoneLink® modules in a typical installation, the Upstream port should be connected to the Downstream port of the next module in the network. The signal direction (input or output) varies depending on whether a connector is Upstream or Downstream.

The Interface tool (ZTC-F64 or ZL.S-F32) should always be connected to the Downstream port of the furthest downstream (based on material and signal flow) unit in the network you wish to configure.

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
1	SENDING/Photo	OUTPUT	INPUT
2	READY	INPUT	OUTPUT
3	DIRECTION	INPUT	OUTPUT
4	RUN	INPUT	OUTPUT
5	FAULT	OUTPUT	INPUT
6	BYPASS[1]	INPUT	OUTPUT
7	SERIAL COMMUNICATION	INPUT	OUTPUT
8	SIGNAL COMMON	--------	

[1]In a ZPA Module, when BYPASS is activated all zones will immediately stop, regardless of their logic state. While in BYPASS, if RUN is activated a Slug Release will be initiated at Bypass Speed. When BYPASS is deactivated the system will return to normal operation, running until each zone is accumulated or the transfer timer elapses.

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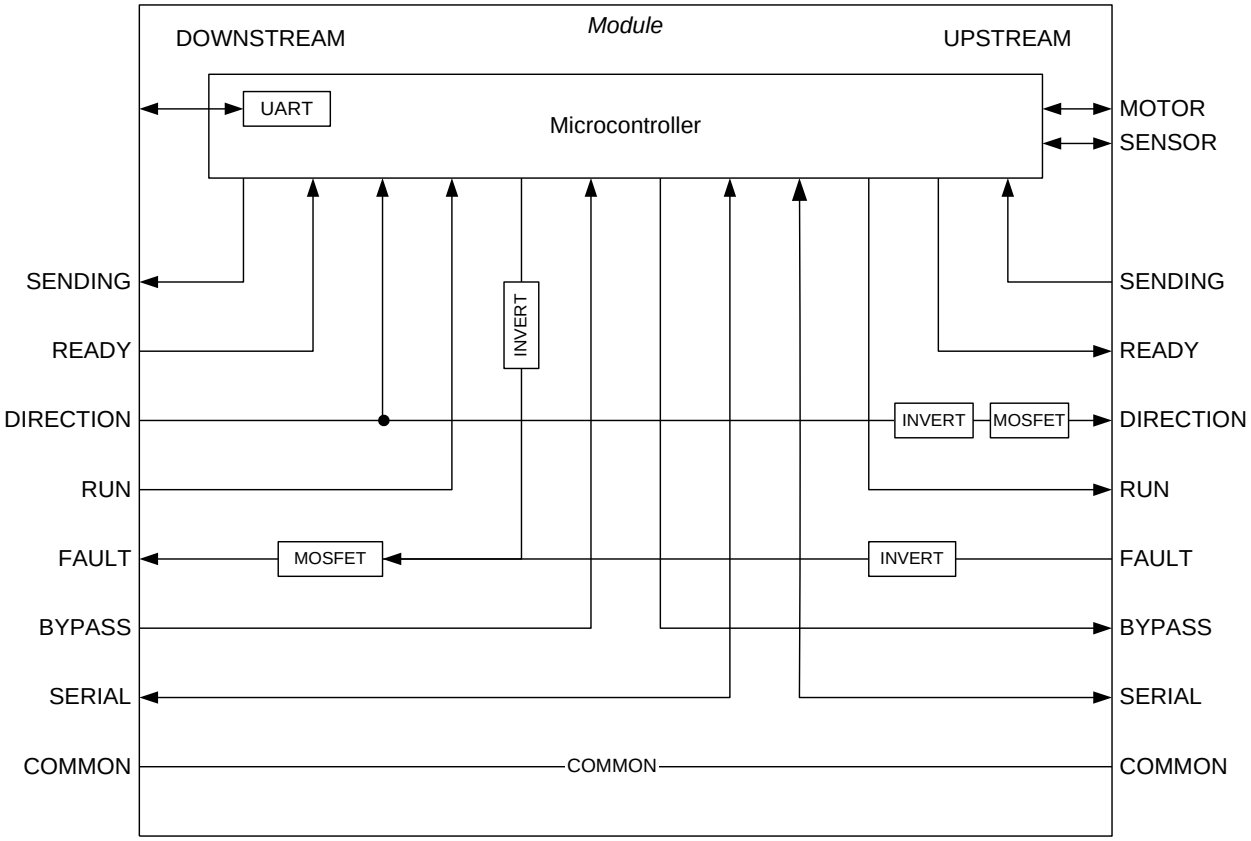
ZoneLink® Block Diagram



Note: Serial is for ZoneLink®.S only.

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ZoneLink®.S Protocol Structure

The ZoneLink®.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 ZoneLink®.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 unit 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 > 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

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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
0	Incorrect Command
1	Invalid Address
2	Invalid Variable ID / Property
3	Read Only Property
4	Invalid Data Length
5	Data Out of Range
8	EEPROM Error
9	Timeout

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

Hardware / Interface Tool Setup

Holjeron has provided two tools for interfacing with ZoneLink®.S enabled modules, the ZoneLink®.S Serial Interface Module (ZL.S-F32) and the F64 Multi-Protocol Configuration Tool (ZTC-F64). Please refer to the datasheet for the interface tool you are using for specifications and instructions on usage, indicators, and connections. Both the ZL.S-F32 and ZTC-F64 interface tools require 24V Power and a standard, off the shelf CAT 5 Cable to connect to the ZoneLink®.S bus network.

Both devices can be used to access both the Dot S Interface GUI and the Dot S ASCII Protocol as described in this document.

Datasheets for these devices and all Holjeron products can be found at https://holjeron.com/support/

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ZoneLink®.S Interface GUI

System Requirements

Windows PC with Windows XP or higher.

DOT S Interface GUI Software Installation Instructions

The DotS Interface GUI Software can be downloaded from https://holjeron.com/support/. The .zip file should be saved to a convenient location on the host PC, and all of the files contained in the .zip file should be extracted together, all in the same folder. The folder will contain the following files:

- A Readme.txt file with pertinent info about the software.
- **DotS V2.0.exe**: This is the executable file to intiate the DotS Interface GUI program.
- Several **Device##.txt** files: These are configuration files for the various ZoneLink®.S enabled products Holjeron produces. Each file contains configurable parameters for a particular product. If the appropriate Device file is not in the same folder as the DotS.exe file, the program will not be capable of configuring the product.

Windows PCs also require the appropriate STMicroelectronics STM32 Virtual Com Port Driver to communicate with both the ZoneLink®.S Serial Interface Module (ZL.S-F32) and the F64 Multi-Protocol Configuration Tool - ZoneLink®.S Kit (ZTC-F64-DOTS).

The appropriate Virtual Com Port driver can be downloaded from https://holjeron.com/support/

Extract the contents of the zip file to a convenient location on your host PC.

Go into the folder you extracted to and run the appropriate version of the driver install package, based on the version of Windows you're running.

Windows 10 Users Please Note: The ST Micro website and readme.txt file with the download indicate that the "native inbox driver" provided with Windows should be used, however this does currently work with our software. Please install the Windows 8 version of the driver (either 32 or 64 bit depending on your PC)

Note: As of 5/18/2018 the download package says Version 1.5.0, but once installed Device Manager will show it as Version 1.4.0

Once the ST Micro Virtual Com Port driver is installed and the DotS software is extracted, open the DotS.exe executable package to run the ZoneLink®.S Interface GUI

Graphical User Interface

With your Interface Tool (F32 or F64) connected to your host system via USB or Serial connection, open the "DotS V2.0.exe" file.

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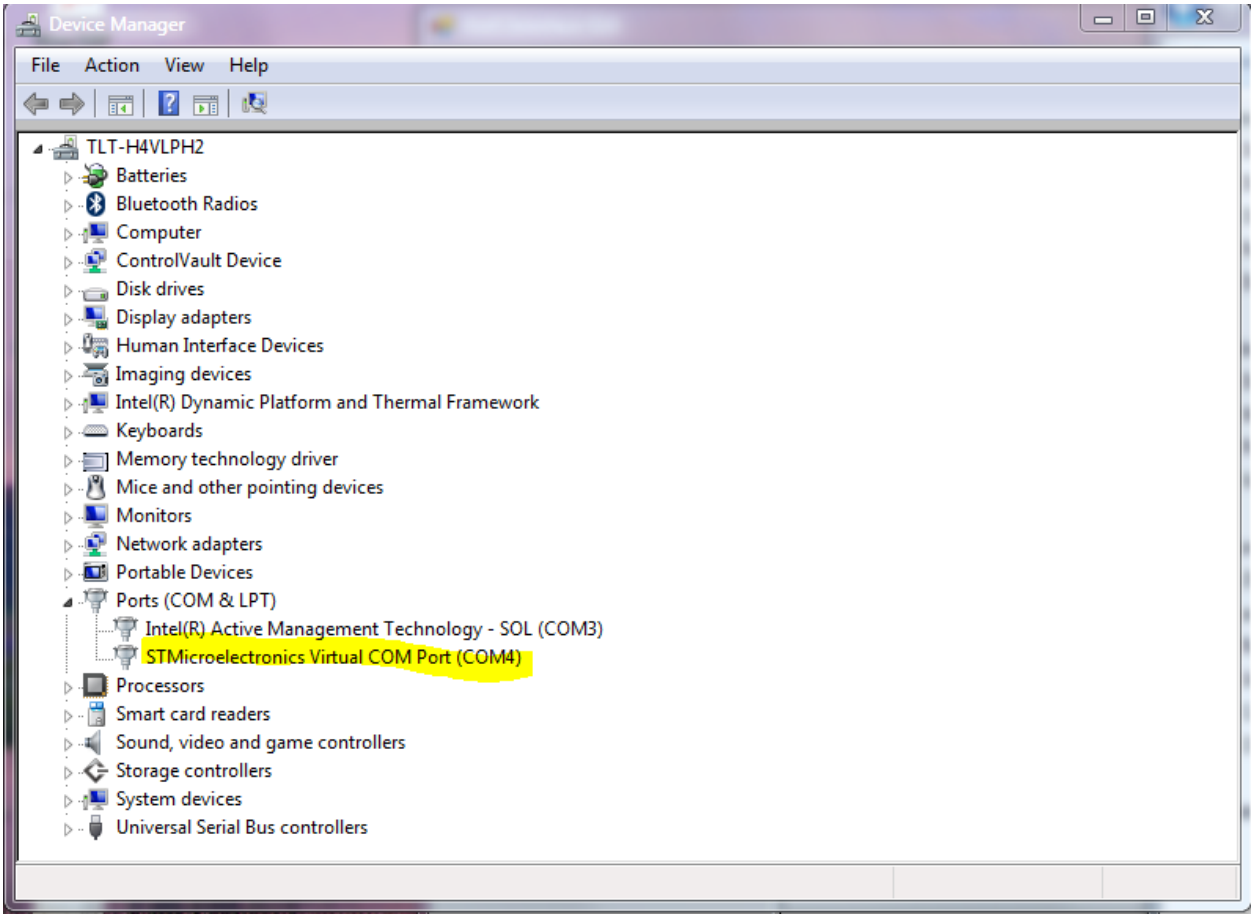
If you don't know what port you're using, you can use Windows Device Manager to view which port number is assibned to the SRMicroelectronics Virtual Com Port Driver (in this case COM4)



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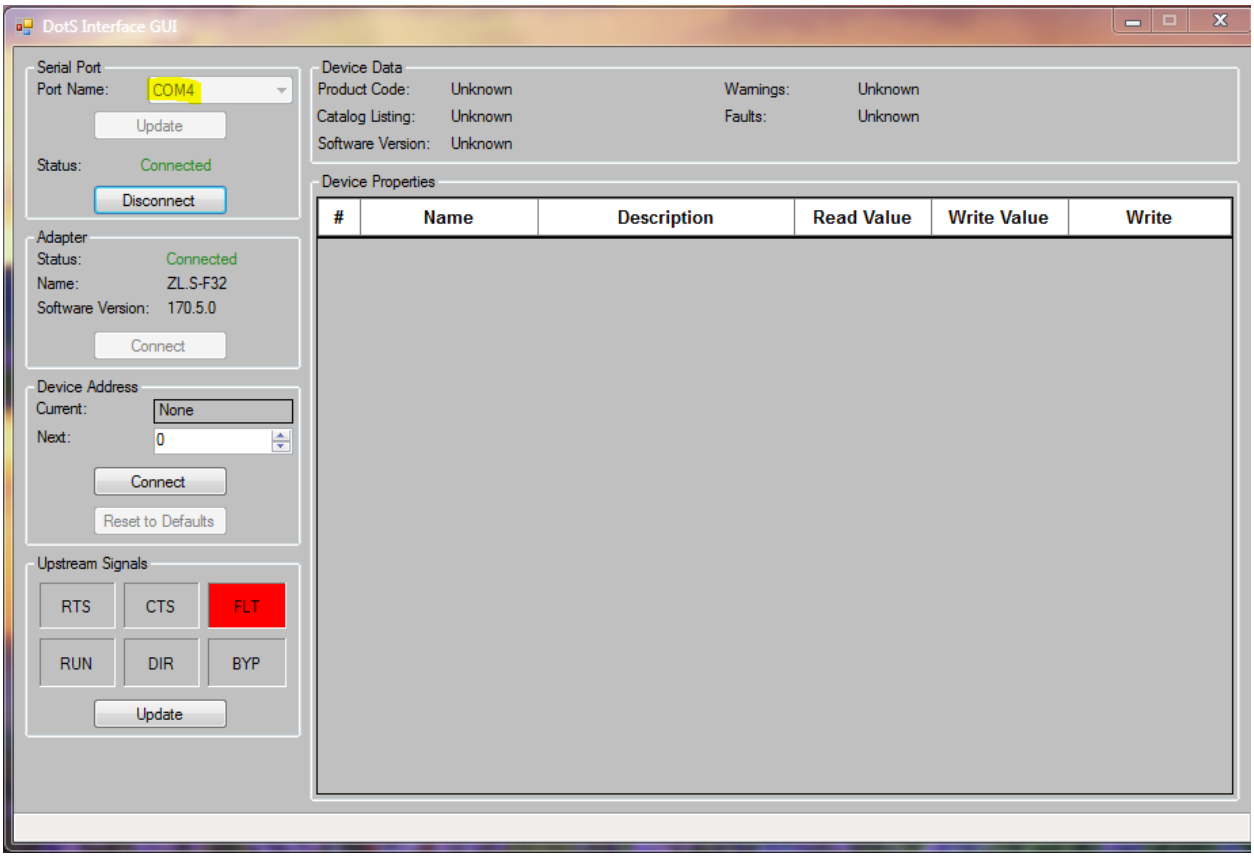
Choose the appropriate serial port for your Interface Tool and hit “Connect” in the Serial Port box:



Make sure that the device or devices that you wish to configure are connected to your interface tool. Your Cat 5 cable should be connected to the “To Downstream” connector on the furthest Downstream device in your bus network.

Hit “Connect” in the Device Address box to load the Device Properties for your device or bus. The DotS Interface GUI will load all of the device properties, with non-configurable settings greyed out.

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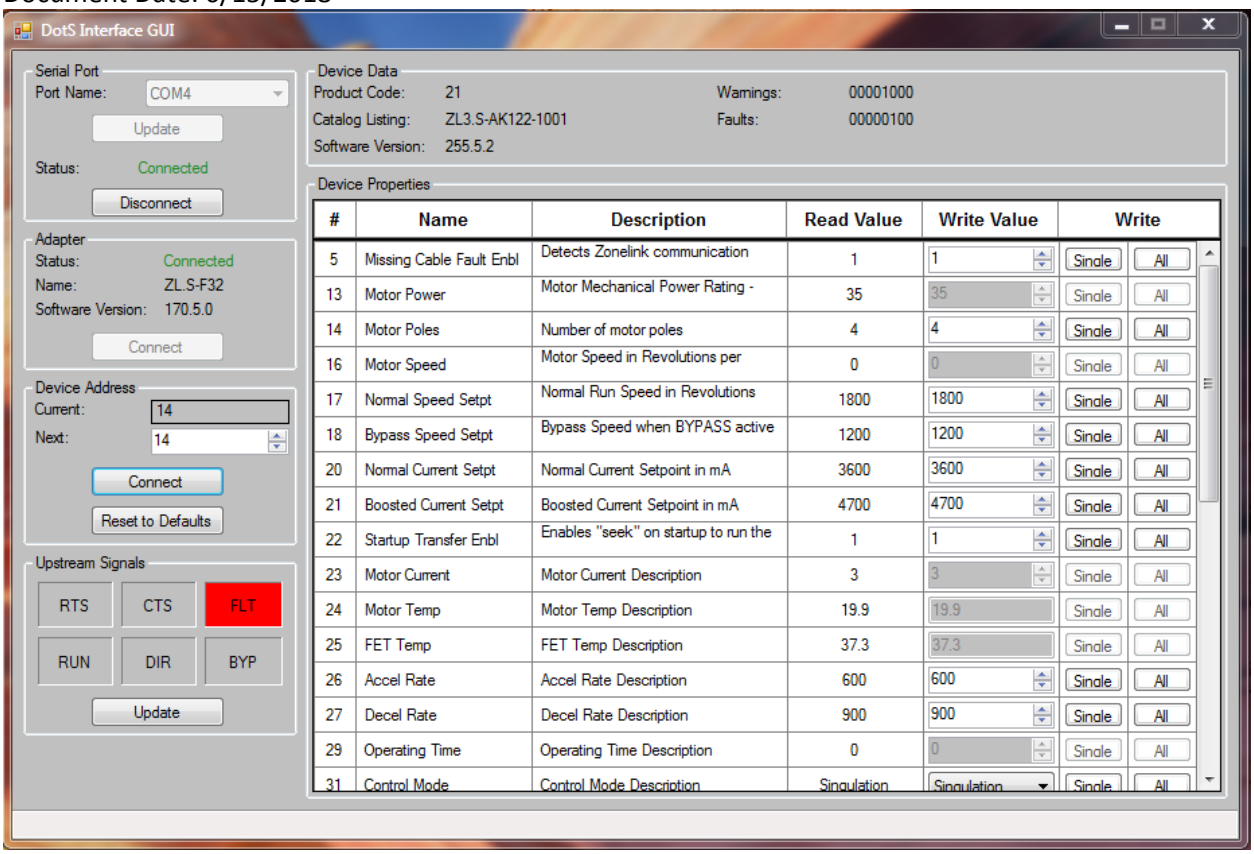

In order to change a setting, modify the value in the “Write Value” column. Hit the “Single” button in the “Write” column to write only to the unit specified in the “Device Address” box in the left pane, or hit “All” to write that value to all of the units on the bus.

Details on configurable settings for specific products can be found in product data sheets available from https://holjeron.com/support/

Need more help? Contact us at support@holjeron.com or 855.804.6828

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ZoneLink®.S ASCII Protocol

The ASCII ZoneLink®.S commands are used with ZoneLink®.S Interface units to configure and control ZoneLink®.S Properties and Actions, as well as ZPA logic signals.

System Requirements

Any terminal or terminal emulation device (such as a PC, Tablet, or Mobile Device with terminal software) which has either an available USB port or an RS-232 port. In the case of an RS-232 port, it should be configured to 9600bps, 8 data bits, no parity, 1 start bit, 1 stop bit (Abbreviated: 9600-8N1).

ZoneLink®.S Commands

These commands are used to read or write values to connected devices on the ZoneLink® network.

Basic Commands

<CR> Carriage Return (ASCII 13) is used to terminate all commands.

? Returns brief ZoneLink®.S Interface command protocol summary as shown here:

```
?
  $Pn?       Read property n from interface.
  Pn?        Read property n from unit 0.
  xPn?       Read property n from unit x.

  Pn=v       Write property n to unit 0.
  xPn=v      Write property n to unit x.
  *Pn=v      Write property n to all units.
  *xPn=v     Write property n to units 0 through x.

  An         Request action n in unit 0.
  xAn        Request action n in unit x.
  *An        Request action n in all units.
  *xAn       Request action n in units 0 through x.

  $Usss?     Read upstream signal state from interface.
  $Usss=b    Write upstream signal state to interface.
    sss=RUN,DIR,BYP,CTS,RTS,FLT,ALL

  Q          Leave F32 emulation mode.
>OK
```

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Read Commands:

Use these commands to view the value that a property is currently set to.
After these commands are processed, the value assigned to that property will be displayed.

- $Pn? Read property n from the ZoneLink®.S Interface units. (ZTC-F64 or ZL.S-F32)
- Pn? Read property n from unit 0.
- xPn? Read property n from unit x.

Device specific properties are detailed in the ZoneLink®.S Attribute Table within the product data sheet for each specific module available from https://holjeron.com/support/ .

Example:

Read value of Property 10 (Catalog Listing) on unit 0:

```
P10?
P10="ZL3.S-AH122"
```

For the interface units (ZL.S-F32 and ZTC-F64) the following readable properties are available:

Property	Description	Type	DATA
0	Product Code	Read Only	String
10	Device Name / Model	Read Only	String
11	Software Version	Read Only	String

Example:

Read value of Property 10 (Catalog Listing) on the Interface:

```
$P10?
$P10="ZL.S-F32"
```

Write Commands:

Use these commands to set the value of a property.

- Pn=v Write value v to property n on unit 0.
- xPn=v Write value v to property n on unit x.
- *Pn=v Write value v to property n on all units.
- *xPn=v Write value v to property n on units 0 through x.

After these commands are processed, a status code from the table below will be returned:

Status Code	Description
OK	Single Unit write command successfully accepted and acknowledged. OR Multiple unit command was successfully accepted and sent.
Error0	Syntax Error – Command not processed
Error1	Invalid Service Request or Address
Error2	Invalid Variable ID or Property
Error3	Read Only Property
Error4	Invalid Data Length
Error5	Data Out of Range
Error8	EEPROM Error
Error9	Timeout

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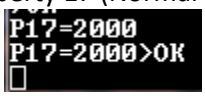
Example:
Set Property 17 (Normal Speed Setpoint) to 2000 RPM:



Action Commands:
If device specific actions are available, they will be detailed in the product data sheet for each specific module.
After these commands are processed, a status code from the table above under Write Commands will be returned.

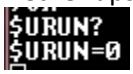
- An Request action n on unit 0.
- xAn Request action n on unit x.
- *An Request action n on all units.
- *xAn Request action n on units 0 through x.

Signal State Commands:
Use these commands to write or read signal states to or from the I/O channels of the interface

- $Usss? Read upstream signal state from interface.
- $Usss=b Write upstream signal state to interface and return status code
  sss=RUN, DIR, BYP, CTS, RTS, FLT, or ALL based on the table below.
  Us=0 Signal Inactive (floating high)
  Us=1 Signal Activated (pulled low)

Signal	Bit Number	ZoneLink® Signal	Upstream Port	Downstream Port
RUN	1 – Far Right	Run	Output	Input
DIR	2	Direction – Reversed from config-ured direction when activated	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

Examples:
Check whether upstream RUN signal is active:



This response indicates that the bit for RUN is set to 0, meaning the RUN signal is not active on the device directly upstream of the interface

Check all six signal states:

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```
$UALL?
$UALL=100000
```

This response indicates that all the signals are inactive (bit set to 0) except the far-left bit which is FLT. This indicates that RUN is OFF, Direction is default, Bypass is not active, Clear to Send is not active, Sending is not active, Fault is active.

Details on configurable settings for specific products can be found in product data sheets available from https://holjeron.com/support/

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EMERGENCY STOPS AND SAFETY RELAYS

It is generally considered good safety practice to have E-stop and/or safety relays/controllers installed in any conveyor system, especially one with multiple control system voltages. Many state and local regulations/codes require them. Please consult qualified personnel who plan and design safety equipment for machines and systems and are familiar with the regulations governing safety in the workplace and accident prevention.

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 controls and device for use with SDS fieldbus networks. To complete your system, have you considered:

- ZoneLink®3 ZPA Controllers for Microrollers and SmartRollers
- ZoneLink®.S Control Modules for 22W and 35W Microrollers w/ Aux I/O
- ZoneLink®TC ZPA Controllers for Microrollers and SmartRollers
- BusBlock I/O and Control Modules for SDS networks
- Custom designed SDS control devices

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Phone: 503.582.0820
Toll Free: 855.804.6828
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Sales: sales@holjeron.com
Support issues: support@holjeron.com

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27520 SW 95th Ave.
Wilsonville OR 97070

www.holjeron.com

About Holjeron

Our products are all designed and produced by us
If you need customized solutions, we can do it. 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 de-liver 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 or 855.804.6828

Membership

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

www.odva.org

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