

Description

The ZL3.S-AH121/ZL3.S-AH122 is a specialized Motorized Roller ZPA Driver Module for Holjeron Microrollers[®]. It includes the following features:

- * 6 PNP Auxiliary I/O points to provide enhanced diagnostic and control functions.
- * ZPA logic is pre-programmed on-board. The controller can also be operated in Slave, Manual or Train modes.
- * RJ-11 quick connect Autosensing NPN/PNP sensor input with sensor missing detection.
- * Snap-in mounting plate for easy installation available.
- * A 'Seek Mode' can be implemented at power up to determine if a load is in the zone but not blocking the sensor.



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.

Specifications

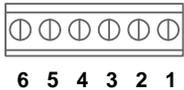
| | | |
|-----------------------------------|--|--|
| Part Number | ZL3.S-AH121 Rev. 01 ZL3.S-AH122 Rev. 01 | ZPA Controller for 22W Microrollers ZPA Controller for 35W Microrollers |
| Electrical Power | Termination Voltage Range Current Consumption, Max | Plug-In, Lever Clamp Terminal 24 VDC (+/- 10%) 100mA plus Powered Roller, Sensor and AUX I/O |
| Motor Connection | Type Number Termination Voltage Range Max Current | Microroller [®] One (1) 10-pin JST Connector (22W and 35W) 24 VDC 2.5A 22W / 3.6A 35W |
| Sensor Input | Type Number Termination Sensor Power Voltage Sensor Input Voltage Range Maximum Sensor Power Current Sourcing Sensor Current Sinking Sensor Current | Autosensing NPN or PNP One (1) RJ-11 24 VDC 0 to 30VDC 50 mA 11 mA Max (Input pulled to 24V) 4.3mA Max (Input pulled to 0V) |
| ZoneLink[®] Ports | Type Number Termination Voltage Range Maximum Current | Current Sinking Inputs/Outputs Two (2) RJ-45 24 VDC 20 mA |
| Auxiliary I/O | See Wiring Section | 6 PNP configured as 3 IN and 3 OUT |
| Environmental | Temperature Humidity Vibration Shock | Storage Operating -30° to 70° C (-22° to 158° F) 0° to 60° C (32° to 140° F) 5-95% RH, non-condensing 2G at 10 to 500 Hz 10G |

Wiring

Auxiliary (AUX) I/O Specifications

| Inputs | |
|----------------------|----------------------|
| Type | PNP |
| Number | 3 |
| Termination | Plug-in, lever clamp |
| Input Voltage Range | 0 to 24VDC |
| Current | 5.3 mA Max |
| Outputs | |
| Type | PNP |
| Number | 3 |
| Termination | Plug-in, lever clamp |
| Output Power Voltage | 24 VDC |
| Output Voltage Range | 0 to 24VDC |
| Current | 250 mA Max @ 25° C |

* Self-resetting fuses for overcurrent.



Auxiliary I/O Functions - Default

| Pin | I/O | Function |
|-----|--------|--|
| 1 | Input | Workstation Hold (RUN in Manual Mode) |
| 2 | Input | RTS (SW3 OFF) or CTS (SW3 ON) (DIR in Manual Mode) |
| 3 | Input | Reserved (BYPASS in Manual Mode) |
| 4 | Output | RTS (SW3 ON) or CTS (SW3 OFF) |
| 5 | Output | Sensor State |
| 6 | Output | Critical Fault (ON when no fault). See detailed description of operation in the Fault Section. |

24 VDC Power Wiring



| Pin | Signal |
|-----|--------|
| 1 | 24 VDC |
| 2 | Common |

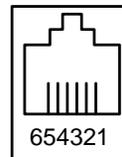
The Power connector is a 2-pin pluggable terminal block that accepts up to 14 gauge wire. Power to the ZoneLink[®] ZPA

module must be 24 VDC. Power supplies should be sized to allow each powered roller zone twice the continuous current rating of the roller. Consult the roller specifications to determine continuous current ratings.

Sensor Wiring

The zone sensor plugs directly into an RJ-11 connection. The controllers are compatible with both PNP and NPN sensors. Consult Holjeron or your sensor manufacturer for appropriate models.

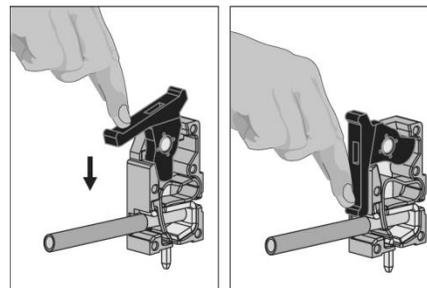
RJ-11 Sensor Jack Connector



| Pin | Signal |
|-----|----------------|
| 1 | Reserved |
| 2 | 24 VDC |
| 3 | Sensor Input 1 |
| 4 | Reserved |
| 5 | Ground |
| 6 | Reserved |

Lever Actuated Terminal Block – 2-pin Power and 6-pin Auxiliary I/O 5.08mm Pluggable Terminal Blocks

Operating the lever-actuated terminal blocks is very easy. Simply insert up to 14 gauge wire and lower the lever until it snaps. To release the wire, raise the lever.



DIP Switch Settings

Factory default settings are all OFF

| Switch | Function | OFF | ON |
|--------|--------------------|-----------------------------|-----------------|
| 1 | Roller Rotation | CCW | CW |
| 2 | Reserved | | |
| 3 | External Interface | Upstream | Downstream |
| 4 | Sensor Type | Normally Open | Normally Closed |
| 5 | Control Mode | See Control Mode Table 1 | |
| 6 | | | |
| 7 | Brake Mode | See Braking Options Table 2 | |
| 8 | | | |

Note on Sensor Configuration (Switch 4):

Switch 4 can be used to invert the sensor signal. Holjeron provides an LED for photo sensor status on the controller. When the LED is ON, that is an indication that there is a load present. Adjust the switch such that the LED is on when a load is present for proper operation. Switch 4 in the OFF position is typically used for diffuse sensors where the signal is Normally Open (off) and the circuit is closed when the load is present. Switch 4 in the ON position is typically used for retroreflective sensors where the signal is Normally Closed (on) and the circuit is opened when the load is present.

Control Mode Table 1

| Control Mode | SW5 | SW6 |
|-------------------|-----|-----|
| ZPA - Singulation | OFF | OFF |
| Train | ON | OFF |
| Slave* | OFF | ON |
| Manual | ON | ON |

*If the direction of the Master is changed, the direction of the Slave must also be changed.

Braking Options Table 2

| Braking Option | SW7 | SW8 |
|------------------|-----|-----|
| Dynamic Braking | OFF | OFF |
| Electronic Brake | ON | OFF |
| Mechanical Brake | OFF | ON |
| Free Roll | ON | ON |

Note: Dynamic Braking is employed to stop the roller under all conditions except Free Roll. Electronic or mechanical braking is employed to hold the roller after stopping (zero motion hold). When a mechanical brake roller is connected, the mechanical brake will engage on power loss in all braking modes.

Rotary Switch RPM Settings

The formula for determining Feet per Minute (FPM) from the RPM is as follows:

$$(\text{Roller Diameter} \times 3.14 \times \text{RPM}) / (12 \times \text{Gear Ratio})$$

Factory default setting is 0

| Setting | ZL3.S-AH121 | ZL3.S-AH122 |
|---------|-------------|-------------|
| 0 | 600 | 750 |
| 1 | 900 | 938 |
| 2 | 1200 | 1125 |
| 3 | 1500 | 1313 |
| 4 | 1800 | 1500 |
| 5 | 2100 | 1688 |
| 6 | 2400 | 1875 |
| 7 | 2700 | 2063 |
| 8 | 3000 | 2250 |
| 9 | 3300 | 2438 |
| A | 3600 | 2625 |
| B | 3900 | 2813 |
| C | 4200 | 3000 |
| D | 4500 | 3188 |
| E | 4800 | 3375 |
| F | DotS | DotS |



Setting the Rotary Switch to 'F' for DotS protocol sets the Control Mode and Speed to the current DotS value. Once in DotS mode, changes to the Rotary Switch only take effect after power cycling. It is recommended that the Rotary Switch only be changed when the device is not powered.

Indication

There are 2 LED's on the ZPA Controller next to the power terminal block. They are labeled SENSOR and STATUS.

The SENSOR LED illuminates amber when the connected sensor has actuated.

The STATUS LED is dual color (red/green). A steady green light indicates normal operation. Warnings and Faults are indicated through a series of red and green flashes. Consecutive green flashes indicate a Warning. Red flashes indicate Faults. The number of red flashes denotes the severity of the condition, while subsequent green flashes define the specific condition.

STATUS LED States

| Status LED | Indication |
|--|--|
| Solid Green | The unit is operating properly. |
| Solid Red | On for 0.5 seconds on startup. After startup, a solid red STATUS may mean the unit has failed and needs to be replaced. |
| Flashing Green | WARNINGS The unit is still functioning but has a condition that should be checked. |
| 1 Red flash, followed by 1 or more Green flashes | APPLICATION FAULT The motor has stopped. The controller will try to clear the fault condition. |
| 2 Red flashes, followed by 1 or more Green flashes | CRITICAL FAULT The motor has stopped. Depending on the fault, the motor and/or ZPA module may need to be replaced. |

Warnings

There are two (2) types of warnings: Application and Predictive. Warnings do not stop the motor from running. Instead, they are an indicator that some form of corrective action is needed. While it is not possible to tell from the flashing green warning LED which warning is indicated, the controller can be queried via .S to determine which warning is active.

Warnings (All Green Flashes)

| Indication |
|---|
| Excessive Current Limit – when the motor is running, every 10 milliseconds the current being consumed by the powered roller is measured and a moving average is updated. If more than 80% of the measurements are at the current limit level then a warning is activated. |
| Excessive Motor Stalls – each time the motor is forcibly stopped by external conditions, the Motor Stall Fault is checked and a moving average is updated. If the motor stops due to a stall more than 10% of the time then a warning is activated. |
| Design Life – a Holjeron Microroller® has a design life of 25,000 hours. When the motor has run for more than the design life a warning is indicated. |
| Low Current – the ZPA Module is reading a current that is below the normal No Load value. |

Faults

Two (2) types of faults occur in ZoneLink[®] ZPA Modules: Application and Critical. Faults cause the motor to stop running, and may require intervention to get a system back operational.

Faults are reported over the AUX I/O (see chart). Any Application or Critical Fault will trigger the AUX I/O Fault.

Application Faults can be reset or cleared to get a system running. The controller will continuously try to run the motor based on the chart below.

Critical Faults typically cannot be cleared, and usually require changing either the motor or ZPA Module. When a critical fault occurs, there are no attempts to restart the motor.

Faults also cause the ZoneLink[®] Fault Output to be ON.

Application Faults (1 Red Flash, followed by Green Flashes)

| Green Flashes | Indication |
|---------------|---|
| 1 | Motor Stall – the ZPA Module is trying to run the motor, yet it hasn't moved for a full second. The motor will attempt to restart after a ten second delay. |
| 2 | Motor Thermistor Fault – the temperature inside the motor is too high. The motor will restart when the motor cools down. (Holjeron Microrollers only) |
| 3 | Jam Fault – the sensor has been blocked for twice the length of the Jam Timer. The motor will stop |
| 4 | Controller Thermistor Fault - the temperature inside the electronics is too high. The motor will restart when the controller cools down. |

 Application Faults are reported over the AUX I/O. When an Application Fault is attempting to restart the roller, the AUX I/O Fault is removed.

Critical Faults (2 Red Flashes, followed by Green Flashes)

| Green Flashes | Indication |
|---------------|--|
| 1 | Commutation Fault – the circuit that controls the motor commutation has failed. |
| 2 | Photo Sensor Missing. The fault is based on no current being monitored to the photo sensor RJ-11 port. Motor will be stopped.* |
| 3 | Low Supply Voltage Fault – the fault activates if the supply voltage to the controller falls below 16VDC. |
| 4 | Reserved |

* This fault is disabled when the controller is in Slave or Manual mode.

 Critical Faults are reported over the AUX I/O and are maintained until the condition is cleared.

Fault/Warning Register

The Fault Register maintains a record of faults and warnings in two records: a real-time instantaneous register and a locked register (historic). Each register consist of 2 bytes as shown below. They can be accessed over .S protocol.

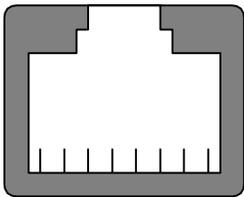
| Fault Register | |
|------------------|-------------------------------|
| Bit | Description |
| 0 | Commutation Fault |
| 1 | Photosensor Missing |
| 2 | Low Supply Voltage |
| 3 | Reserved |
| 4 | Motor Stall |
| 5 | Motor Thermistor Fault |
| 6 | Jam Fault |
| 7 | Controller Thermistor Fault |
| Warning Register | |
| Bit | Description |
| 0 | Excessive Current Limit |
| 1 | High No-Load Current |
| 2 | Excessive Motor Stalls |
| 3 | Design Life End |
| 4 | Jam Warning |
| 5 | Low Supply Voltage Warning |
| 6 | Motor Thermistor Warning |
| 7 | Controller Thermistor Warning |

ZoneLink[®]

ZoneLink[®] is the communications layer between controllers that provides control signals, diagnostic data, and access to .S configuration attributes. ZoneLink .S Attributes are accessed using an RS-232 to ZoneLink interface, Part Number ZL.S-F32.

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).

ZoneLink[®] RJ-45 Connector



8 7 6 5 4 3 2 1

ZoneLink[®] Pin Assignments

| Pin | Function | Upstream | Downstream |
|-----|-------------------|---------------|---------------|
| 1 | RTS | Input | Output |
| 2 | CTS | Output | Input |
| 3 | DIRECTION | Input | Output |
| 4 | RUN | Input | Output |
| 5 | FAULT | Output | Input |
| 6 | BYPASS | Input | Output |
| 7 | .S COMMUNICATIONS | Bidirectional | Bidirectional |
| 8 | COMMON | Pass-Through | |

RTS/CTS Definitions:

| I/O | Entry Zone Function | Exit Zone Function |
|----------------|---------------------|--------------------|
| Output to PLC | CTS ↑ | RTS ↓ |
| Input from PLC | RTS ↓ | CTS ↑ |

Entry Zone CTS/RTS Operation:

- CTS: Output to PLC. "Clear to Send" is always sent upstream as an output from the controller and received upstream by the PLC as an Input.
- RTS: Input from PLC. "Ready to Send" is always sent downstream by the PLC as an output and received downstream by the controller as an Input.

Exit Zone CTS/RTS Operation:

- RTS: Output to PLC. "Ready to Send" is always sent downstream as an output from the controller and received downstream by the PLC as an input.
- CTS: Input from PLC. "Clear to Send" is always sent upstream by the PLC as an output and received upstream by the controller as an input.

ZoneLink® .S Attributes Table - ZL3.S-AH121/AH122

ZoneLink .S Attributes are accessed using an RS-232 to ZoneLink interface (ZL.S-F32) or F64 Multi-Protocol Configuration Tool (ZTC-F64-DOTS)

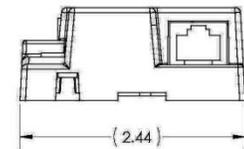
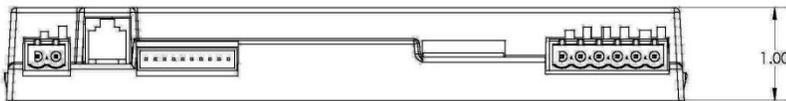
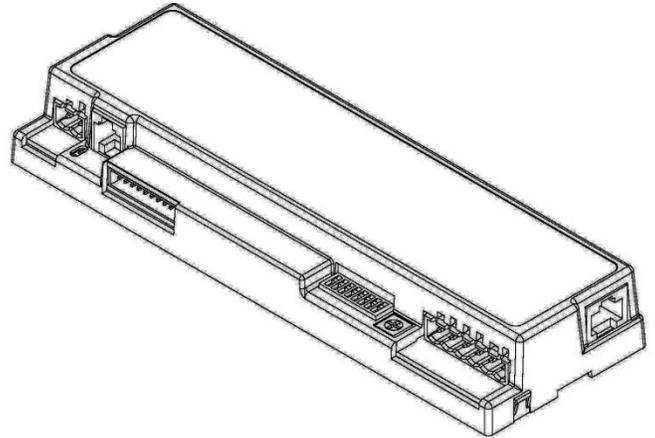
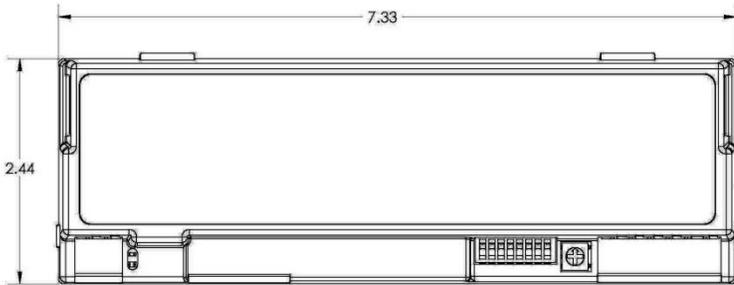
| Attribute# | Attribute Name | Description/Notes | Type | Units | Default | Range |
|------------|--------------------------------|---|---------|--------|-----------|-----------|
| 0 | Product code | ZL3.S-AH121 = 16, ZL3.S-AH122 = 17 | Byte | - | 16/17 | N/A |
| 1 | Input variable | | 4 Bytes | - | | 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 | ZL3.S-AH121 or ZL3.S-AH122 | 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 setpoint | | 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 |

Timers

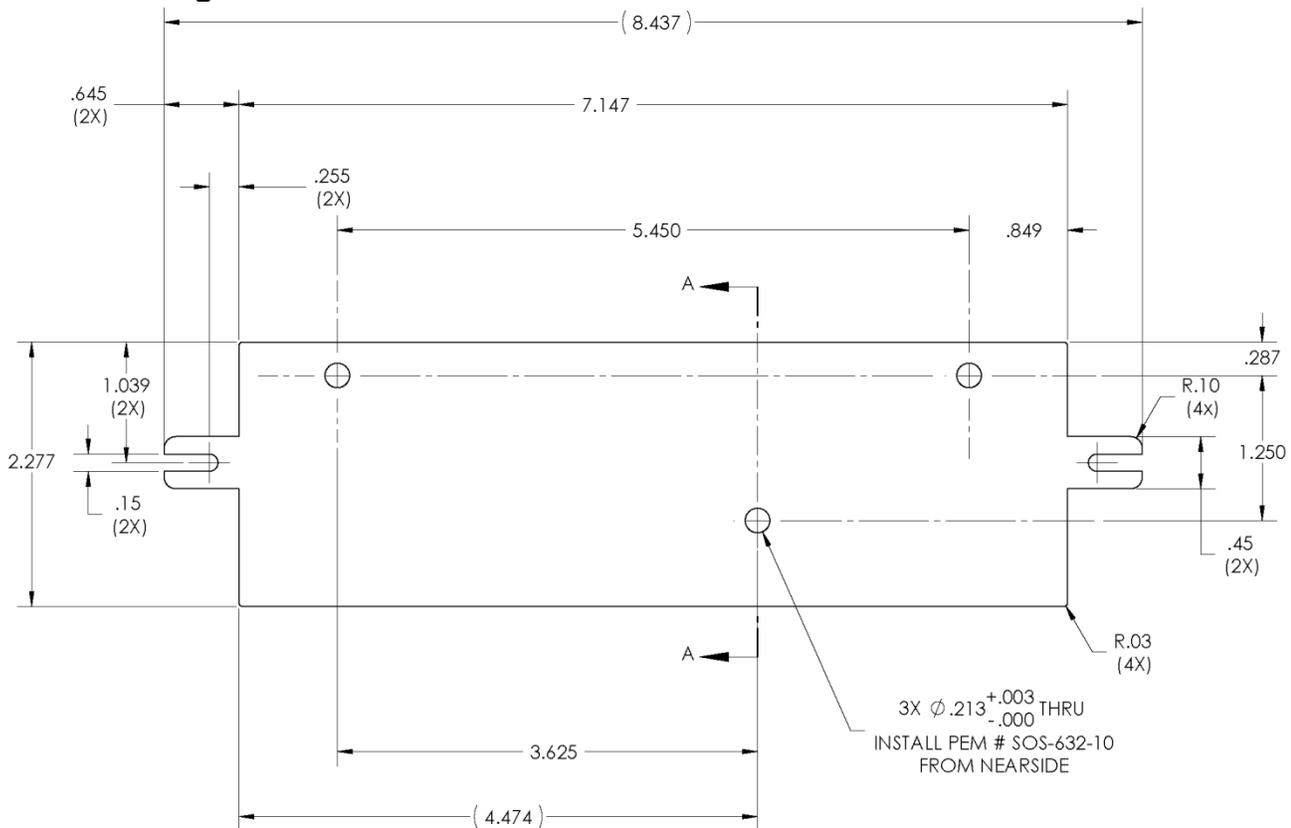
ZoneLink[®] ZPA modules are equipped with a set of timers that can be used to tailor functionality in certain applications. ZoneLink .S Attributes are accessed using an RS-232 to ZoneLink interface (ZL.S-F32) or F64 Multi-Protocol Configuration Tool (ZTC-F64-DOTS). Listed below are the timer's functional descriptions, default values, ranges, and .S attribute numbers:

| Timer | Description | Timer Default | Timer Units | Timer Range | .S Attribute# |
|---------------------|---|---------------|-------------|-------------|---------------|
| Release Delay Timer | When a product is accumulated, the release timer delays how long a load is held before it is released downstream. This is used to ensure gaps between loads. | 25 | 10ms | 0-255 | 36 |
| Gap Timer | When running, attempts to maintain a gap between units. | 3 | 10ms | 1-255 | 34 |
| Transfer Timer | Once a load is released and cleared the upstream sensor, the transfer timer is used to ensure the load reaches the downstream sensor. If the Transfer Timer expires, the accumulation logic is reset. | 40 | .1sec | 1-255 | 33 |
| Sleep Timer | Once a load clears the downstream sensor, and there are no other loads being released into the zone, the zone will run for the length of the sleep timer before turning off. | 20 | .1sec | 0-255 | 35 |
| Jam Timer | If a zone is running to transfer a load, and the downstream sensor remains blocked for the length of the Jam Timer, then the module will stop the zone and indicate a fault. The controller will retry in approx. 10 seconds. | 80 | .1sec | 1-255 | 32 |
| Hold Timer | If the hold input is active and the sensor transitions from blocked to unblocked, the hold timer is started. The zone will not give a CTS to the upstream zone or start running until the hold timer expires. | 40 | .1sec | 0-255 | 42 |

Dimensions (inches)
Controller

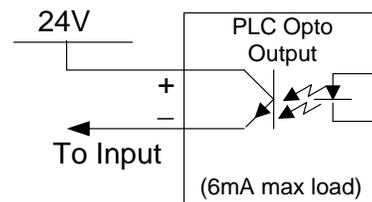
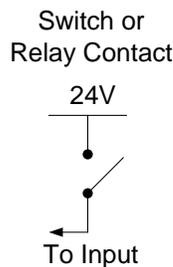
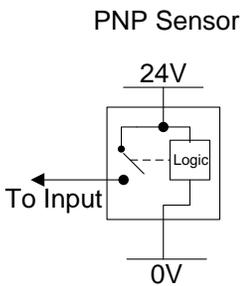
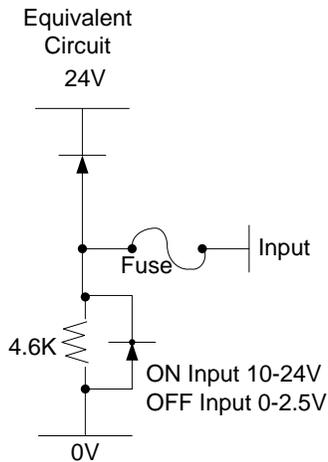


Rear Mounting Plate

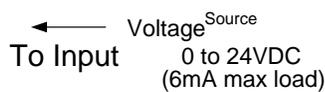


AUX I/O Wiring Diagrams

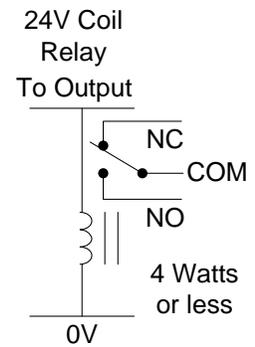
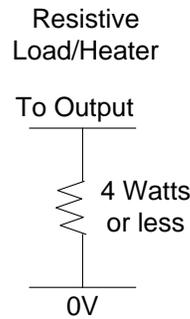
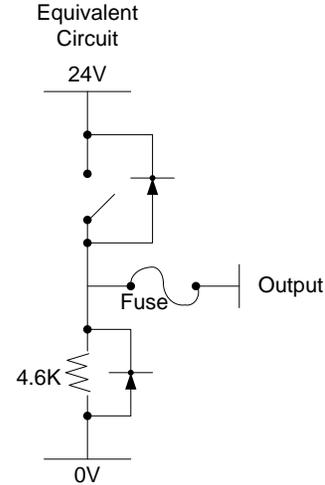
Inputs



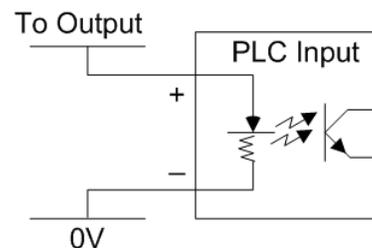
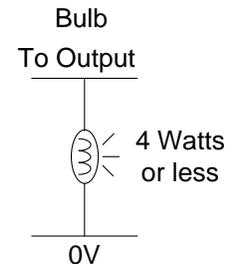
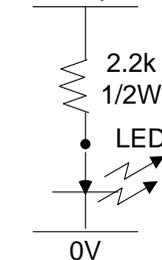
Voltage Input



Outputs



LED Output





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

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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:

ZoneLink3 ZPA Controllers for Microrollers and SmartRollers

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

Holjeron

27520 S.W.95th Ave
Wilsonville, Oregon 97070
Phone 503.582.0820
Fax 503.582.9166
www.holjeron.com

email

General info: info@holjeron.com
Sales: sales@holjeron.com
Support issues: support@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 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**

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