ZoneLink®.S Driver Module

For use with Holjeron Microroller®

ZLD-6411-0 0509 TECHNICAL DATA SHEET

Description

The ZoneLink®.S Driver Module connects directly to a Holjeron Microroller® motorized roller, and is linked to a ZoneLink® Controller using standard category 5 patch cables (RJ-45).

The ZoneLink®.S Driver Module uses microcontroller-based commutation of the brushless motor, which provides the following benefits:

- Predictive diagnostics embedded in the Driver Module to flag when a powered roller should be replaced, in advance of the roller failing.
- Closed-loop speed control to hold roller speed at a constant value, improving the ability to tune a conveyor system.

The zone sensor connects to the Driver Module, keeping all wiring local to a zone, reducing wiring cost and complexity.

Specifications

Part Numbers	ZoneLink®.S Driver, 22 Watt Motor		ZL.S-DK111
	ZoneLink®.S Driver, 35 Watt Motor		ZL.S-DK111-35
	ZoneLink®.S Driver, 22 W w/ Aux I/O		ZL.S-DK112
	ZoneLink®.S Driver, 35 W w/ Aux I/O		ZL.S-DK112-35
Electrical Power	Termination		Plug-In, Spring Clamp Terminal
	Voltage Range		24 VDC (+/- 10%)
	Current Consumption, Max		100mA plus Powered Roller and Sensor
Motor Connection	Type		Microroller®
	Number		One (1)
	Termination		9-pin Connector
	Voltage Range		24 VDC
	Max Average Current (22W)		2.0 Amps
	Max Average Current (35W)		2.8 Amps
Sensor Input	Type		NPN or PNP
	Number		One (1)
	Termination		Plug-in, Spring Clamp Terminal
	Sensor Power Voltage		24 VDC
	Sensor Input Voltage Range		0 to 30VDC
	Maximum Sensor Power Current		50 mA
	Sourcing Sensor Current		11 mA Max (Input pulled to 24V)
	Sinking Sensor Current		4.3mA Max (Input pulled to 0V)
ZoneLink®.S Port	Type		Current Sinking Inputs/Outputs
	Number		One (1)
	Termination		RJ-45
	Voltage Range		24 VDC
	Maximum Current		250mA per output
Environmental	Temperature	Storage	-30° to 85° C (-22° to 185° F)
		Operating*	-15° to 45° C (5° to 113° F)
	Humidity		5-95% RH, non-condensing
	Vibration		2G at 10 to 500 Hz
	Shock		10G
	*35W loaded 100% at 100% duty cycle		
Physical	Dimensions		4.61” H x 2.81” W x 1.13” D
	Weight		2.2 oz
	Mounting		Mounting base
	Indication	Power	Green
		Status	Red/Green
		Sensor	Green

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

Holjeron
9524 SW Tualatin-Sherwood Rd.
Tualatin, Oregon 97062
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 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

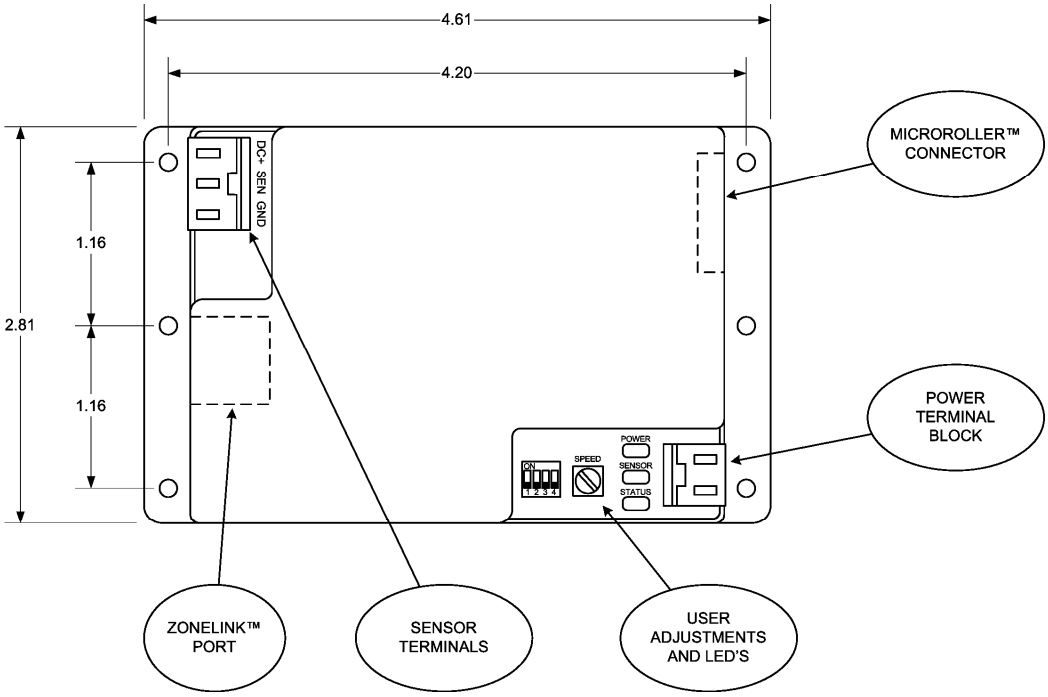
Holjeron is an active participant in key industry organizations and standards bodies.

DeviceNet
www.odva.org

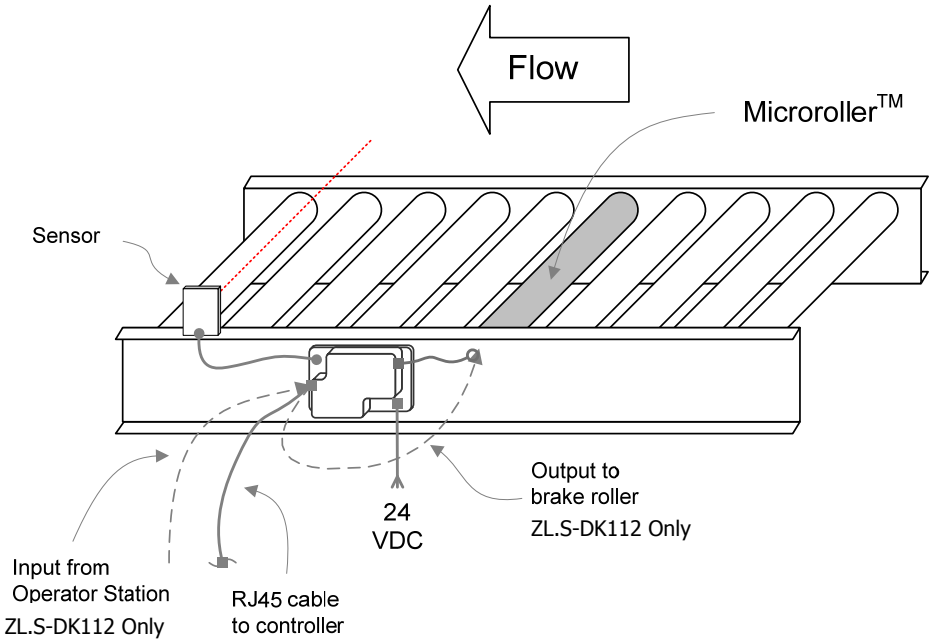
MATERIAL HANDLING INDUSTRY OF AMERICA
www.mhia.org

Holjeron is a wholly-owned subsidiary of Matthews International Corporation

Dimensions and Layout

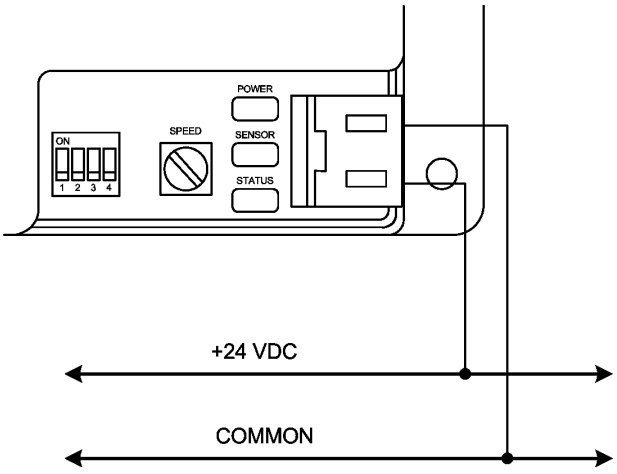


Typical Installation



Wiring

24 VDC Power

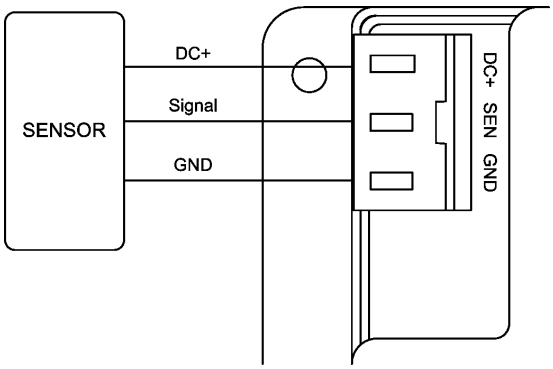


The Power Connector is a 2-pin pluggable terminal block with locking header that accepts up to 14 gauge wire. Use leverage from a small screwdriver to release the terminal block. Power to the ZoneLink®.S Driver Module must be 24 VDC. Power supplies for the 22W Driver Module should be sized to allow each powered roller zone to draw 2.2 amps continuously; and at least 3 amps for the 35W Driver Module.

NOTES

1. Systems that have multiple power supplies should have the commons of each power supply tied together.
2. There is no limit to the number of ZoneLink® Driver Modules in a system.

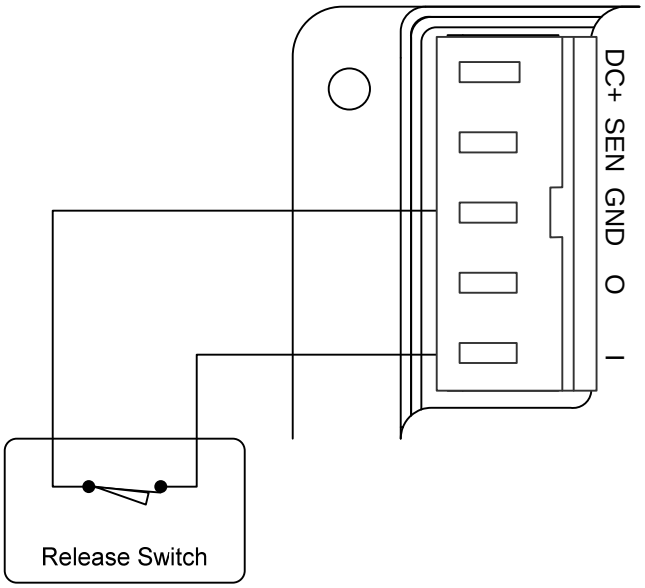
Sensor Wiring

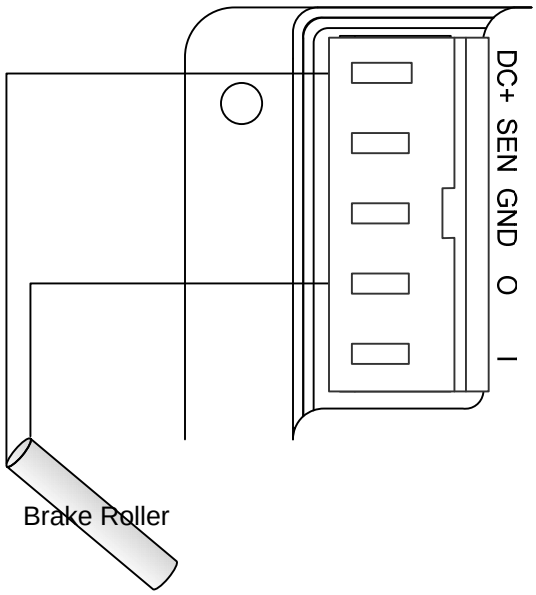


Terminal block for the sensor is a 3-pin plug-in style with locking header that accepts up to 14 gauge wire. Use leverage from a small screwdriver to release the terminal block. The ZoneLink® Driver Modules are compatible with both PNP and NPN sensors.

I/O Wiring

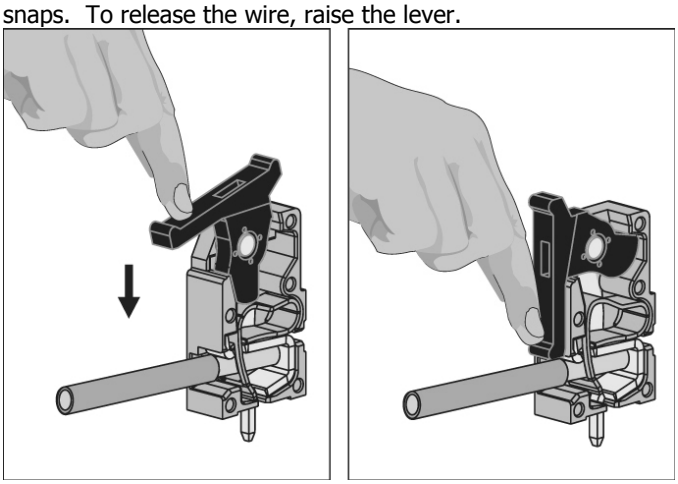
The ZL.S-DK112 can accommodate a 5-pin terminal block to connect to a sensor and an external input signal, to enable work station hold mode, or to an output signal, which could be used to operate an external device such as a brake roller. The terminal block has a locking header that accepts up to 14 gauge wire. The 5-pin terminal operates similarly to the 3-pin terminal.





Lever Actuated Terminal Block

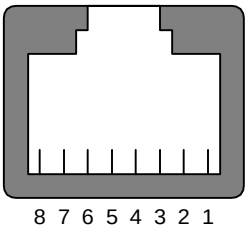
Operating the lever-actuated terminal blocks is very easy. Simply insert up to 14 gauge wire and lower the lever until it snaps. To release the wire, raise the lever.



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).

ZoneLink® RJ-45 Connector



ZoneLink® Pin Assignments

Pin	Function
1	SENSOR STATE OUTPUT
2	RESERVED
3	DIRECTION INPUT
4	RUN INPUT
5	FAULT OUTPUT
6	BYPASS INPUT (1)
7	.S COMMUNICATIONS
8	COMMON

(1) The BYPASS INPUT, when enabled in conjunction with a RUN INPUT, causes the motor to run at the BYPASS SPEED. The default BYPASS SPEED is 2400 RPM (full rated speed).

Microroller® Selection

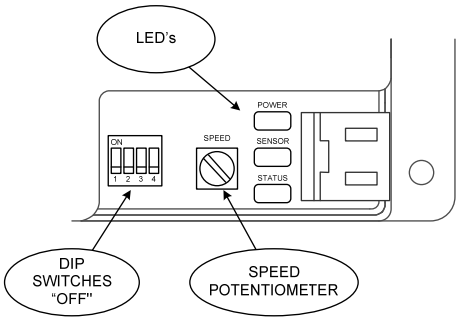
The following information regarding the sizing of a 22W Microroller® is for reference only. Each application should be reviewed regarding the suitability of a Microroller® for that application.

Roller P/N	Rated Speed (FPM)		Tangential Force (Lbs)
	1000 RPM	2400 RPM	
MR-AD-1.9-xxx-4	4	16	67.0
MR-D-1.9-xxx-5	5	22	49.0
MR-D-1.9-xxx-7	8	33	32.8
MR-D-1.9-xxx-10	14	60	17.8
MR-D-1.9-xxx-15	17	73	15.1
MR-D-1.9-xxx-20	24	100	11.0
MR-D-1.9-xxx-30	29	122	9.0
MR-D-1.9-xxx-40	55	238	4.9

All Data Based on 1.9 Inch Diameter Roller

Configuration

DIP switches to configure the functionality of the ZoneLink® Driver Module are located near the power terminal block. The switches are numbered 1 through 4, beginning with the switch furthest from the speed adjustment. The ON position for each switch is away from the nearest edge of the Driver Module.



DIP Switches -- *Manual Configuration Options*

Manual configuration of a ZoneLink® Driver Module requires setting a single DIP switch to set the direction of rotation, setting the second DIP switch OFF, and then setting the desired speed using the speed potentiometer.

Driver DIP Switch Assignment

Switch	Function	OFF	ON
1	Direction of Rotation	CCW	CW
2	Run Speed Reference	Pot	Serial
3*	Aux Output functionality	Pulse Out	Brake
4	Sensor Type	NO	NC

*Note: Switch #3 is operable on DK112 drivers only. It is not used on DK111 drivers.

The **Direction of Rotation** is used to set the default rotation of the Microroller® in normal use. This allows for the ZoneLink® Driver Module to be installed in various locations on a conveyor system.

The **Run Speed Reference** for the Microroller® can be generated using one of two different methods: the potentiometer on the ZoneLink®.S Driver or over .S serial communications. When DIP Switch 2 is set to OFF then the speed potentiometer controls the RUN Speed. When set ON, the RUN speed is set through .S communications. Using the potentiometer, motor RPM can be set within 4 RPM over the range of 250 to 4000 RPM. Using .S control, any integer RPM value within the ability of the motor may be set.

The brushless motors in the Microroller® deliver the maximum torque from 1000 to 2400 RPM in the 22W Microroller®; and from 1000 to 3300 RPM in the 35W Microroller®. The ZoneLink® .S Driver Module can set the motor speed outside of these ranges, up to their maximum speed (3200 RPM for the 22W version and over 4000 RPM for the 35W version). However, it is recommended to size the application--and set the speed-- to have the maximum torque.

The **OUTPUT functionality** is applicable only to the ZL.S-DK112 with auxiliary I/O family of drivers. In the ON position, the output signal can be used to operate a brake roller. Normally, the signal is weakly pulled up to 24v. When the brake is to be activated, the "active low" signal is sunk to ground allowing the brake solenoid to swing, engaging the brake. In the OFF position the output provides a 24 volt square wave at a frequency one tenth that of the motor RPM.

The **SENSOR type** selection is used to configure the sensor output to activate when sensor itself activates. This setting allows the use of both sensors that activate when blocked (Normally Open, Sw #4 OFF) and sensors that activate when not blocked (Normally Closed, Sw #4 ON).

Serial Configuration

Serial configuration of a ZoneLink® Driver Module requires connection to a ZoneLink®.S Controller capable of configuring ZoneLink®.S products, or using one of the ZoneLink®.S configuration tools available from Holjeron. Consult the documentation for the specific tool being used.

Product Information (Required in all products)

ID	Description	R/W	Default/Notes
0	Product ID	R	4 = 22 Watt 5 = 35 Watt
1-4	Reserved	R	
5	Diagnostic Register format	R/W	0 = 8 bit 1 = 16 bit
7	Diagnostic Register (Instantaneous)	R	See Diagnostic Register
8	Diagnostic Register (Locked)	R	See Diagnostic Register

Motor Properties

ID	Description	R/W	Default/Notes
16	Motor RPS	R	
17	Normal Speed Setpoint	W	1800
18	Bypass (w/Run) Speed Setpoint	W	2400
19-21	Reserved		
22	No-Load Current Enable	W	0 = No-load current not enabled
23	Motor Current	R	
24	Driver Temperature	R	
25-28	Reserved		
29	Operating Time	R	
30	Reserved		

Diagnostic Register

Faults		Warnings	
Description	**Bit**	**Description**	**Bit**
Commutation Fault	0	Excessive Current Limit	8
Low Current	1	High No Load Current	9
Reserved	2	Excessive Motor Stalls	10
Work Station Hold Engaged	3	Motor Design Life Exceeded	11
Motor Stall Fault	4	Reserved	12
Motor Thermistor Fault	5	Reserved	13
Reserved	6	Reserved	14
Driver Thermistor Fault	7	Reserved	15

Indication

There are three LED's on a ZoneLink® Driver Module next to the power terminal block. They are labeled POWER, ACTIVE and STATUS.

The POWER LED is green, and will illuminate whenever 24 VDC is applied to the controller and the controller is healthy. If 24 VDC is present and the POWER LED is not on then the unit needs to be replaced.

The ACTIVE LED is illuminates green when the connected sensor has is actuated.

The STATUS LED is dual color (red/green). 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 defined 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 and will attempt to restart when the fault has cleared.
2 Red flashes, followed by 1 or more Green flashes	CRITICAL FAULT The motor has stopped. Depending on the fault, the motor and/or controller 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.

Warnings also cause the ZoneLink® Fault Output to toggle state every 0.5 seconds.

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 30% of the measurements are at the current limit level then a warning is activated.
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. If the average No Load Current increases 20% over the life of the roller then a High No Load Current warning is issued. Note: No Load Current Enabled must be set to 1 for this diagnostic to be active. See Serial Configuration Section for more detail.
Excessive Motor Stalls – each time the motor is stopped, 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 Microroller® has a design life of 25,000 hours. When the motor has run for more than the design life a warning is indicated.

Faults

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

Application Faults can be reset or cleared to get a system running.

Critical Faults typically can not be cleared, and usually require changing either the motor or Driver Module.

Faults also case the ZoneLink® Fault Output to be ON.

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

Green Flashes	Indication
1	Motor Stall – the Driver Module is trying to run the motor, yet it hasn't moved for a full second. The motor will attempt to start 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.
3	Not used
4	Driver Thermistor Fault - the temperature inside the driver electronics is too high. The motor will restart when the motor cools down.

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	Low Current – the Driver 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.
3	Not used
4	Work station hold activated – Not a true "fault." Indicates that an external signal has stopped the roller. Normally used to force accumulation.