

Description

The ZoneLink® Driver Module connects directly to a Holjeron MDR motor driven roller.

The ZoneLink® Driver Module uses a modern microcontroller which directly controls the commutation of the brushless DC motor in the Microroller® to provides the following benefits:

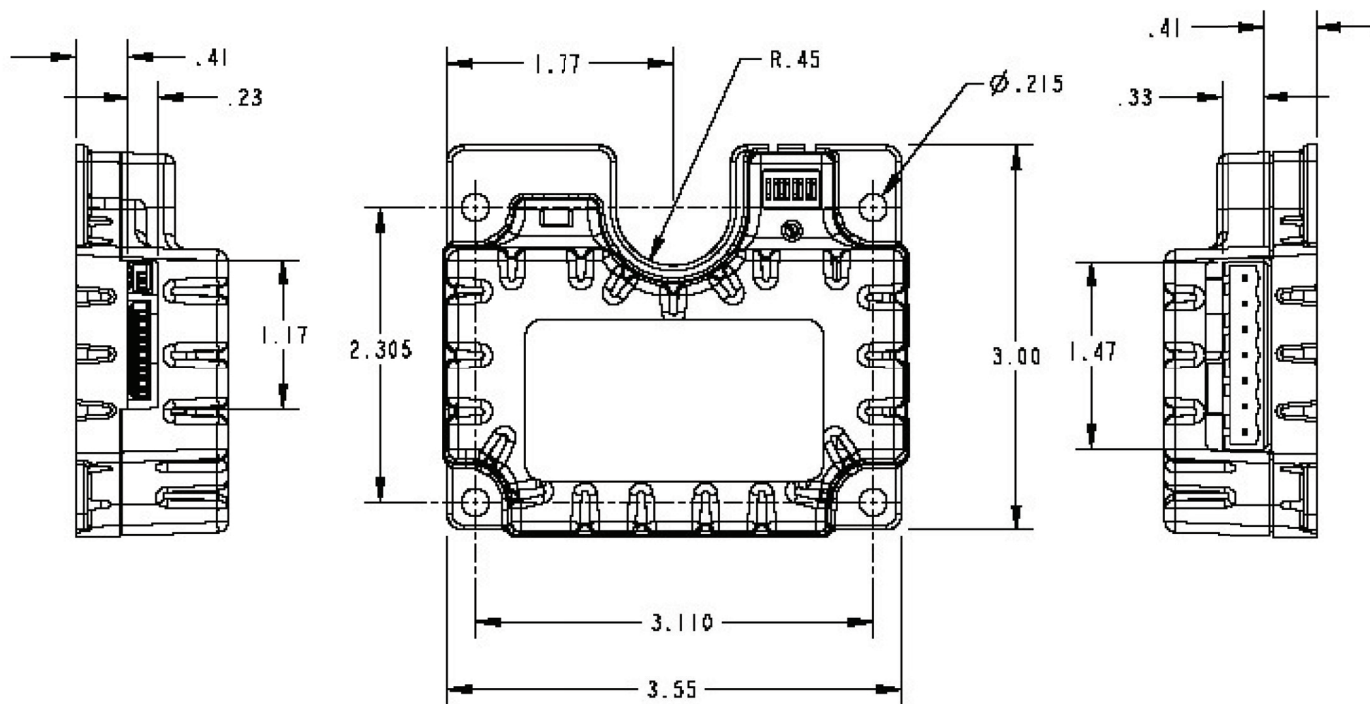
- * Closed-loop control holds roller speed at a constant value, providing the ability to finely tune the speed of the conveyor system.
- * High starting torque even at very low speeds and consistent torque at all speeds within the capabilities of the selected Holjeron MDR.
- * A single Driver Module for control of both 22W and 35W Holjeron MDR motor driven rollers.
- * A single Driver Module for control of standard, electronic brake, and mechanical brake rollers.
- * Discreet speed selection for accurate zone-to-zone speed control. With support for external analog speed control to support customization of conveyor speed on-the-fly.
- * Multiple fault indications for easy and thorough troubleshooting.



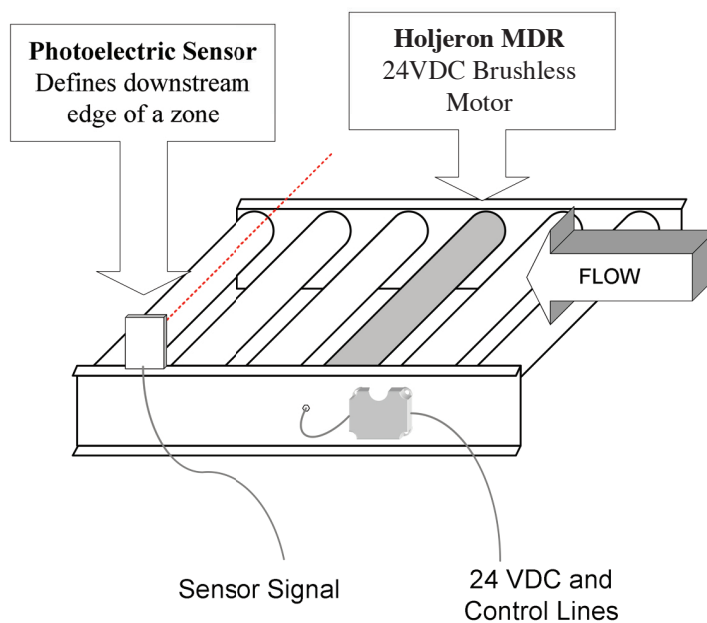
Specifications

Part Number	ZL-DH100	ZoneLink® Driver for 22W and 35W Motors w/ Mechanical or Electronic Brake Output (Configured via DIP Switches)
Electrical Power	Termination Voltage Range Current Consumption	Plug-In Cage Clamp 5.08mm Terminal Block 24 VDC (+/- 10%) 100 mA plus the Holjeron MDR
Motor Connection	Type Number Termination Voltage Range Max Average Current	Holjeron MDR Compatible One (1) Robust 10-pin 2.5mm keyed connector 24 VDC 3.6 A
Control Port	Type Termination Voltage Range Max Continuous Avg Current Boost (Starting) Avg Current Internal Fuse	Current sinking inputs & output Plug-in Cage Clamp 5.08mm Terminal Block 24 VDC 2.6 A (22W) / 3.6 A (35W) 3.4A (22W) / 4.0A (35W) 5A
Potentiometer	Internal or External	300-3600 rpm (22W) 300-4200 rpm (35 W)
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
Physical	Dimensions Weight Mounting Indication	3.70" L x 3.15" W x 1.10" D 4 oz Mounting base identical to V12/21 Solid Green – Normal Flashing Green/Red – Fault

Dimensions and Layout



Typical Installation



Wiring

Power and Control Wiring

The Power Connection is pin 1 on the driver control port with the Common return on pin 2. Power to the ZoneLink® Driver Module must be 24 VDC. Power supplies for systems driving 22W rollers should be sized to allow each motor-driven roller zone to draw 3.6 amps continuously. For installations utilizing 35W rollers should allow at least 4.2 amps per driver module.

A Holjeron MDR can be signaled to run by sinking Control Pin 3 to Common. The run direction of the Holjeron MDR can be changed by sinking Control Pin 4 to Common. When the ZoneLink® Driver Module or Holjeron MDR experiences a FAULT Control Pin 7 will be pulled to Ground.

NOTE: The ZoneLink® Driver MUST share Common with the external Control I/O.

External Speed Control and Control Port Wiring

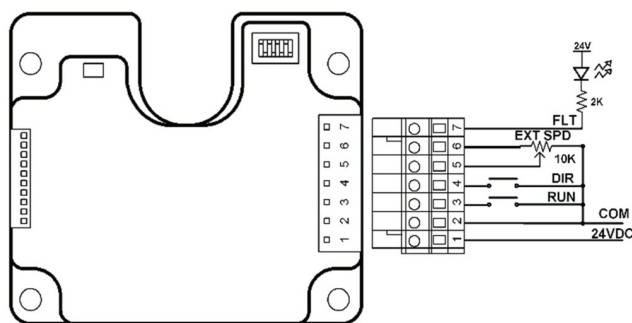


Figure 1 Control Port Wiring

Pin	Function
7	Fault
6	3.3V Reference
5	Analog Speed Input (see Note)
4	Direction
3	Run
2	Common
1	24VDC

Table 1 Control Port Wiring

Control pins 3, 4 have weak internal pull-up resistor array and will float near 21 volts relative to Common.

Control pin 5 can be used for speed control using an external potentiometer or an externally supplied control voltage (such as the output of an analog output module of a PLC). The external speed control signal can be used to set motor run speed to any value from the minimum support (approximately 300rpm) to the maximum speed for the motor type (speeds above the maximum fixed value selectable with DIP switches might not produce the full rate torque due the design constraints of the Holjeron MDR. If using a potentiometer, a higher turn version will provide more precise speed control. The external pot range will be the same as on-board input range, when using a 10K pot. If using an external potentiometer, the wiper (typically center) connects to pin 5, control pin 6 (3.3VDC reference) must be connected to one side of the potentiometer while the opposite side is connected to Common. If connecting an externally sourced analog control voltage module to pin 6, configure the source to limit to the range of 0-3.3VDC. Voltages over 3.3VDC or below 0VDC WILL damage the driver. For proper operation, you must tie the DC common wires for the driver and analog control source together.

Note: In some customized modes, pin 6 input may be used as a sinking (active when pulled to Common [pin 2]) logical input, rather than an analog input for external speed control. In such cases, the input must either be left floating (such as when controlled by a dry relay contact) in the inactive state or it may be connected to a 3.3V source (relative to Common). As noted above, this pin should never be connected to the 24VDC supply (or any other voltage greatly than 3.3V or less than 0V relative to Common).

Control pin 7 has a weak 5.1K internal pull-up resistor to 24VDC, so it will float near 24 volts relative to Common when inactive. The active load current on pin 7 should not exceed 100mA. If the fault signal load is inductive, a protective flyback diode must be used with the load to avoid damage to the driver.

Configuration

DIP switches to configure the functionality of the Zonelink® Driver Module are located on the upper right of the module, above the control port receptacle. The switches are numbered 1-8, beginning with the switch on the left. The ON position for each switch is toward the top of the Driver Module.

Please Note: The ZL-DH100 can be used to drive both 22 Watt and 35 Watt Holjeron MDR motor driven rollers using DIP switches 1-3 to set the power level appropriately. Previously, separate Holjeron products were used to drive the different roller types. The modernized ZL-DH100 replaces all the 22 watt variants ZL-DK100, ZL-DK100B, ZL-DK100EB, and the 35 watt ZL-DK100-35. Custom modes have also been added to support the functionality of the DK121-1001 and DK121-1002 starting with Rev 02 units (late 2023 production).

- DIP switches 1, 2, and 3 are used to set Power and Braking Modes as shown in Table 3.
- DIP switch 4 is used to set the default rotation of the Zonelink® in normal use as shown in Table 2. This allows for the Zonelink® Driver Module to be installed in various locations on a conveyor system.
- DIP switches 5 through 8 can be used to set the speed, as shown in tables 3 and 4.

DIP Switch	Function
1	Motor Power, Braking Mode/Customized Functionality Table
2	
3	
4	Direction: OFF=CCW, ON=CW
5	Power Specific Speed Table
6	
7	
8	

Table 2 General Driver DIP Switch Assignment

DIP Switches			MDR	Braking Mode
1	2	3		
OFF	OFF	OFF	22W	Dynamic
ON	OFF	OFF	22W	Electronic Hold
OFF	ON	OFF	22W	Mechanical Hold (requires "Brake Roller")
ON	ON	OFF	35W	Dynamic
OFF	OFF	ON	35W	Electronic Hold
ON	OFF	ON	No Operation	Reserved
OFF	ON	ON	35W	Custom DK121-100x
ON	ON	ON	22W	Custom DK121-100x

Table 3 Power and Braking Mode DIP Switch Assignments

Braking Mode Application Notes

The ZL-DH100 also enables three different braking modes in one driver module. Previously, separate SKU's were available from Holjeron to achieve different braking modes. The ZL-DH100 Driver Module can be used in Electronic Braking, Mechanical Braking, and standard Dynamic Braking mode, replacing the legacy ZL-DK100EB, ZL-DK100B, and ZL-DK100 models.

Dynamic Braking is the default mode of operation for the driver module and is designed to work with standard Holjeron MDRs. When the run power is removed from the MDR, it stops without electrical input from the controller due to the mechanical properties of the motor, gearbox, and other components of the MDR system. Power from the motor is fed back into the driver module while the system slows down and dissipated as heat.

Electronic Hold Braking mode is designed to work with both standard and mechanical brake Holjeron MDRs. This is a "brake and hold" function and is not designed to be a 'positioning' controller.

When used with a standard Holjeron MDRs, this feature gives the user the capability to apply braking functionality for less cost than mechanical brake solutions and allows for standardization on a single part number for both driver and Holjeron MDR. However, on power loss, braking capability is lost.

When used with a mechanical brake Holjeron MDR, the Electronic Braking feature saves wear on the brake mechanism while providing mechanical braking in case of power loss. When used with a mechanical brake, and with DIP switch 1 OFF and DIP switch 2 ON, the ZL-DH100 will function exactly like the legacy ZL-DK100B product.

Mechanical Braking mode is designed to be used in conjunction with a mechanical brake Holjeron MDR which is equipped with a mechanically actuated brake that is intended to be used as a safety feature to hold loads on inclines or in other situations where holding a load stationary is critical in the case of loss of power.

Speed Settings: The ZL-DH100 offers three methods to set the speed: internal pot, external pot and DIP switches 5-8. The following table lists the possible motor rpm settings. The ON position for each switch is toward the top of the Driver Module. To predict the surface speed of the roller divide the motor rpm by the gear ratio and multiply by the circumference of the roller in the unit of travel per minute desired. (Example: 2400 RPM with 5:1 gearbox and 40.5 feet circumference [1.91" diameter roller] = 240 FPM)

DIP Switch				22 Watt Motor
5	6	7	8	Motor RPM
OFF	OFF	OFF	OFF	Internal Pot, range 300 to 3600 RPM
ON	OFF	OFF	OFF	1100
OFF	ON	OFF	OFF	1200
ON	ON	OFF	OFF	1300
OFF	OFF	ON	OFF	1400
ON	OFF	ON	OFF	1500
OFF	ON	ON	OFF	1600
ON	ON	ON	OFF	1700
OFF	OFF	OFF	ON	1800
ON	OFF	OFF	ON	1900
OFF	ON	OFF	ON	2000
ON	ON	OFF	ON	2100
OFF	OFF	ON	ON	2200
ON	OFF	ON	ON	2300
OFF	ON	ON	ON	2400
ON	ON	ON	ON	External Pot, range 300 to 3600 RPM

Table 4 DIP Switch 5-8 Settings for 22 Watt Driver

DIP Switch				35 Watt Motor
5	6	7	8	Motor RPM
OFF	OFF	OFF	OFF	Internal Pot, range 300 to 4200 RPM
ON	OFF	OFF	OFF	1150
OFF	ON	OFF	OFF	1300
ON	ON	OFF	OFF	1450
OFF	OFF	ON	OFF	1600
ON	OFF	ON	OFF	1750
OFF	ON	ON	OFF	1900
ON	ON	ON	OFF	2050
OFF	OFF	OFF	ON	2200
ON	OFF	OFF	ON	2350
OFF	ON	OFF	ON	2500
ON	ON	OFF	ON	2650
OFF	OFF	ON	ON	2800
ON	OFF	ON	ON	2950
OFF	ON	ON	ON	3100
ON	ON	ON	ON	External Pot, range 300 to 4200 RPM

Table 5 DIP Switch 5-8 Settings for 35 Watt Driver

22W Ratio	Gearbox	Rated FPM		Motor RPM		FPM @ RPM			Meter/Min. @ RPM		
	Class	Min	Max	Min	Max	300	2400	3000	300	2400	3000
5	-40	55	238	550	2380	30	240	300	9.1	73.1	91.4
7	-35	42	180	588	2520	21.4	171.4	214.3	6.5	52.2	65.3
9	-30	29	122	522	2196	16.7	133.3	166.7	5.1	40.6	50.8
11.56	-20	24	100	555	2312	13	103.8	129.8	4	31.6	39.5
15	-15	17	73	510	2190	10	80	100	3	24.4	30.5
25	-10	14	60	700	3000	6	48	60	1.8	14.6	18.3
49	-5	5	20	490	1960	3.1	24.5	30.6	0.9	7.5	9.3

Table 6 - Example 22W roller gearing and speed ranges

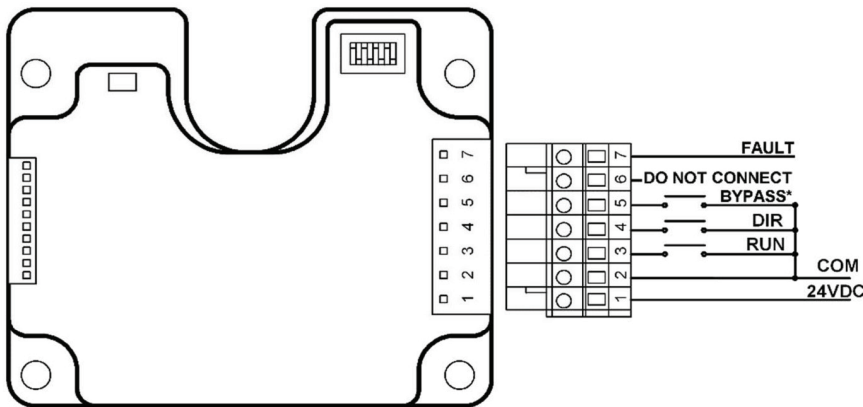
35W Ratio	Gearbox	Rated FPM		Motor RPM		FPM @ RPM			Meter/Min. @ RPM		
	Class	Min	Max	Min	Max	300	3000	4200	300	3000	4200
5	-40	94	328	940	3280	30	300	420	9.1	91.4	128
7	-35	80	280	1120	3920	21.4	214.3	300	6.5	65.3	91.4
9	-30	65	229	1170	4122	16.7	166.7	233.3	5.1	50.8	71.1
11.56	-20	43	146	994	3376	13	129.8	181.7	4	39.5	55.4
15	-15	31	107	930	3210	10	100	140	3	30.5	42.7
25	-10	26	84	1300	4200	6	60	84	1.8	18.3	25.6
49	-5	13	42	1274	4116	3.1	30.6	42.9	0.9	9.3	13.1

Table 7 - Example 22W roller gearing and speed ranges

Tables above are for 1.9" diameter rollers

For 2.24" multiply speed by 1.17

For 2.38" multiply speed by 1.24

Custom DK121-1001 / DK121-1002 Wiring
(Only available DH-100 Rev 02 and later.)

Figure 2 DK121-100x ONLY Wiring

Pin	Function
7	FAULT
6	DO NOT CONNECT
5	BYPASS (must not exceed 3.3V)
4	DIRECTION
3	RUN
2	COMMON (0VDC)
1	24VDC

Table 8 Control Port Wiring
Custom DK121-1001 / DK121-1002 operating mode

To operate the DH100 in DK121-1001/DK121-1002 emulation mode, DIP Switches 1, 2, and 3 should be ON for normal 22W motor operation. (For the non-standard 35W operation, turn DIP Switch 1 OFF.)

When RUN is active and BYPASS is inactive, the motor will run as per Internal POT or fixed DIP switch based speed tables on Page 5.

When RUN and BYPASS are active at the same time, the motor will run at 250 RPM.

When BYPASS is active and RUN is inactive, the motor will run at 2,400 RPM (In 35W mode, the speed is 3,100 RPM.)

NOTE: The BYPASS input voltage must be in the range of 0V to 3.3V. Higher voltages will damage the motor drive. The input is best driven by a normally open relay contact or switch connection to Common; however, it can also be driven by an open collector/open drain interface that pulls to common when active.

If DIRECTION is active, the roller will rotate in the opposite direction from what is set by DIP Switch 4.

Faults and Indicators

If the motor thermistor or the driver card thermistor senses that the motor is overheating, the Zonelink® driver will restrict power to the motor. The driver will automatically reset the motor after the motor cools to below acceptable temperature for about 10 seconds.

Indication

There is one dual color (red/green) LED on a ZoneLink® Driver Module upper left corner of the module.

Whenever 24 VDC power is applied and the driver is functioning normally, the LED will show solid green. If 24 VDC is present and the LED is not on, the unit needs to be replaced.

Flashing green followed by flashing red indicates a FAULT.

Status LED States

Two types of faults occur in ZoneLink® Driver Modules: Application and Critical. Faults cause the motor to stop running and require intervention to return to proper operation.

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

Application Faults (1 Red Flash, followed by 1-4 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 re-start after 10 seconds.
2	Motor Thermistor Fault – The motor has reached its temperature limit and has stopped. The motor will be ready to start again about 10 seconds after it cools below its overtemp limit.
4	Driver Thermistor Fault – The driver circuitry has reached its temperature limit and has cut off power to the motor. The driver will be ready supply power again about 10 seconds after it cools below its overtemp limit.

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

Critical Faults (2 Red Flashes, followed by 1-4 Green Flashes)

Green Flashes	Indication
1	Commutation Fault – the circuit that controls the motor commutation has failed, or that the motor connector is not fully inserted
2	Low Current – the Driver Module is reading a current that is below the normal No Load value. This is typically occurs when the mechanical link internal to the powered roller has broken. The remedy is to replace the roller.
3	Low Supply Voltage Fault – the fault activates if the supply voltage to the controller falls below 16VDC.

**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, for 18 months after the date of shipment by Seller, 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 upon its return to Seller within the warranty period. **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 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:

- **Holjeron MDRs**
- **Square Shell Motorized Pulleys for Modular Belting**
- **ZoneLink® 3 ZPA Controllers for Holjeron MDRs and Smart Rollers**

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About the Holjeron brand:

Our products are all designed and produced by us.

We give you the technology that best suits your needs. 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.

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



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