



E24TM SOLUTIONS MANUAL

e24iTM

e24TM

CONTENTS

Motors	3	3 E24™ Motors	34
PowerCubes	3	2 EZLogic® Zones & 1 E24™ Motor per Zone	35
Control Cards	4	1 EZLogic® Zone & 1 E24™ Motor per Zone	35
E24i™	4	1 EZLogic® Zone & 2 E24™ Motors per Zone	36
Installation Guide	4	1 EZLogic® Zones & 3 E24™ Motors per Zone	36
Diagnostics and Troubleshooting	5		
Application Information	5		
E24™ Standard Control Card	6		
Installation Guide	7		
Diagnostics and Troubleshooting	8		
Card Requirements	8		
Application Information	9		
E24™ Transfer Control Card	10		
Installation Guide	11		
Diagnostics and Troubleshooting	12		
Card Requirements	12		
Trouble Shooting	13		
E24™ HP Card	14		
Installation Guide	15		
Diagnostics and Troubleshooting	16		
Card Requirements	16		
What is Standard?	17		
Advanced EZLogic Controls	17		
Global Speed Controller	18		
E24EZ Transfer Merge EZLogic® Control Function	19		
This function controls the traffic in the area of a transfer merge in Hytrol model E24EZ conveyors. The transfer merge function provides a “traffic cop” control for an incoming conveyor line merging onto a trunk conveyor line at 90° onto a pop-up transfer when both conveyors are zero-pressure conveyors equipped with EZLogic® zone controllers. All of the control is provided by the EZLogic® controllers, and minimal to no wiring is required at installation.			
Spur Merge EZLogic® Control Function	21		
This function controls the traffic in the area of a spur merge. It requires a connection kit to connect the merge controller with the spur discharge zone. The spur-merge function provides a “traffic cop” control for a spur conveyor line merging onto a trunk conveyor line when both conveyors are zero-pressure conveyors equipped with EZLogic® zone controllers. All of the control is provided by the EZLogic® controllers, and no wiring of any kind is required at installation.			
Square Merge EZLogic® Control Function	23		
This function controls the traffic in the area of a square merge. The square merge function provides a “traffic cop” control for an incoming conveyor line merging onto a trunk conveyor line at 90° when both conveyors are zero-pressure conveyors equipped with EZLogic® zone controllers. All of the control is provided by the EZLogic® controllers, and minimal wiring is required at installation.			
E24™ Transfer Drawing and Parts List	25		
E24™ Single Diverter	27		
E24™ Double Diverter	28		
E24™ Powered Transition Roller	29		
E24™ Gate	30		
E24EZ Gate	31		
Wiring Diagrams			
1 E24™ Motor	32		
2 E24™ Motors	33		

1) Motors

Below is a chart of the different standard 24V motors:

Motor Size	36W (E24i™)	100W	125W	160W	200W
Hytrol P/N	033.09022	033.09001	033.090014	033.090023	033.090018
Voltage	24VDC	24VDC	24VDC	24VDC	24VDC
Amperage (Rated)	1.5A	4.0A	5.0A	6.5A	8.0A
Amperage (No Load)	0.13A	0.17A	0.21A	0.27A polarity</td <td>0.32A</td>	0.32A
Watts (Rated)	36W	96W	120W	156W	192W
Speed (Rated)	350 RPM	280 RPM	350 RPM	450 RPM	560 RPM
Speed (Minimum)	70 RPM	56 RPM	70 RPM	90 RPM	112 RPM
Torque (Continuous)	4 in-lbf	15 in-lbf	15 in-lbf	15 in-lbf	15 in-lbf
Torque (Starting)	8 to 11 in-lbf	42 in-lbf	42 in-lbf	42 in-lbf	42 in-lbf

The E24i™ (36W) motor has a built in motor control card mounted on it. The other motors all require a separate motor control card. See Section 3 for motor control cards information.



2) PowerCubes

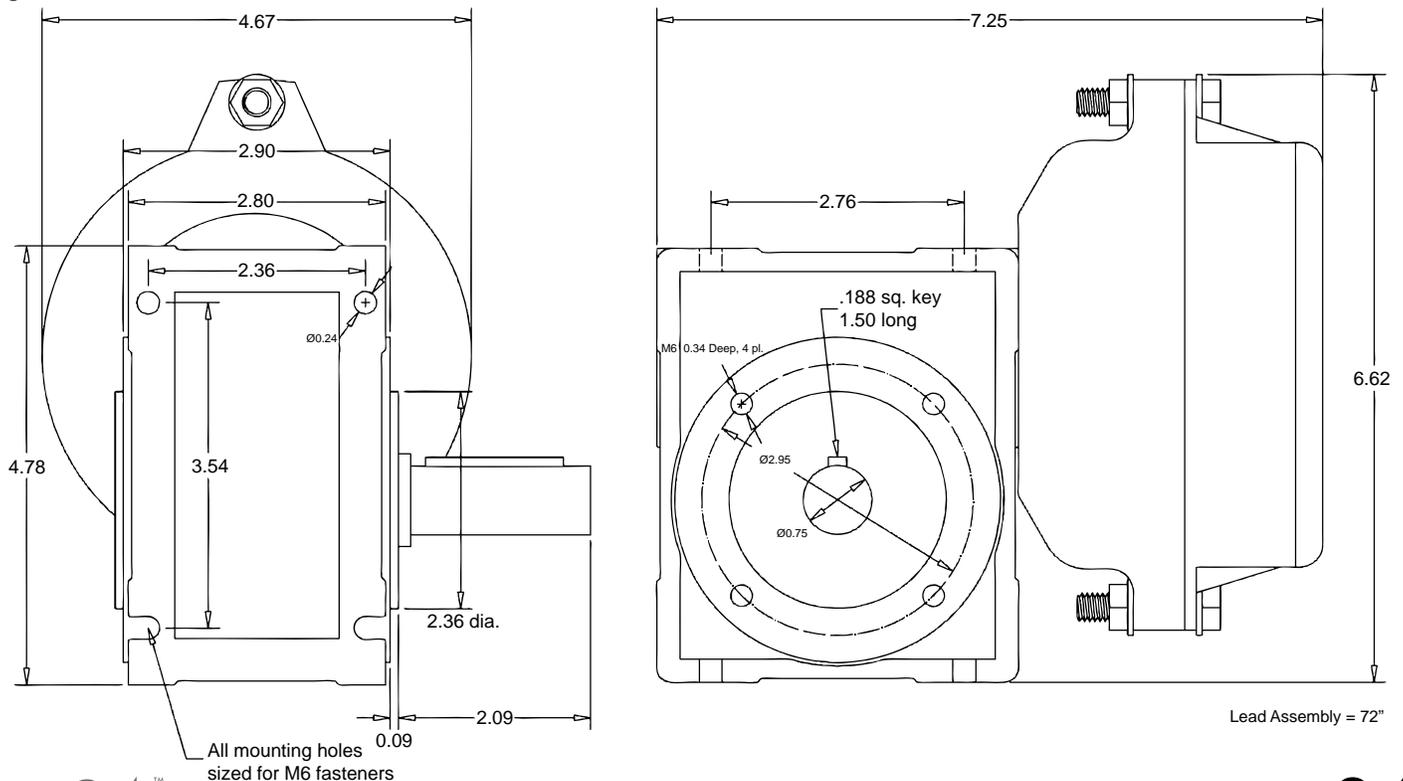
Below is a chart of the different standard 24V PowerCube motors:

Motor Size	125W (E24i™)	125W	160W	160W	200W	200W
Reducer Ratio	5:1	7.5:1	5:1	7.5:1	5:1	7.5:1
Hytrol P/N	907.0310	907.0311	907.031145	907.031147	907.03115	907.031175
Voltage	24VDC	24VDC	24VDC	24VDC	24VDC	24VDC
Amperage (Rated)	5.0A	5.0A	6.5A	6.5A	8.0A	8.0A
Speed (Maximum)	70 RPM	46.7 RPM	90 RPM	60 RPM	112 RPM	74.7 RPM
Speed (Minimum)	14 RPM	9.3 RPM	18 RPM	12 RPM	22.4 RPM	14.9 RPM
Torque (Min. Continuous)	40 in-lbf at 70 RPM	60 in-lbf at 46.7 RPM	30 in-lbf at 90 RPM	40 in-lbf at 60 RPM	40 in-lbf at 112 RPM	60 in-lbf at 74.7 RPM
Torque (Max. Continuous)	80 in-lbf at 38 RPM or lower	120 in-lbf at 9.3 RPM	80 in-lbf at 18 RPM	120 in-lbf at 12 RPM	110 in-lbf at 22.4 RPM	160 in-lbf at 14.9 RPM

Notes:

- 1) There is not a 100W motor available for the PowerCube.
- 2) Other ratios are available: 5:1, 7.5:1, 10:1, 15:1, 20:1, 25:1, and 30:1.
- 3) The characteristics of the motor are such that torque increases as the speed decreases.
- 4) The motors used on the Powercube are not the same as the motors used on the E24™ conveyor. The motors used in PowerCubes have a shorter round shaft in lieu of the "D" shaft used on the E24™ conveyor.

Figure 3A



3) Control Cards

Hytrol has four different motor control cards.

- 1) E24i™ control card that is integrated with the motor.
Hytrol Part Number 033.09023.
- 2) Standard control card that is used with the standard 100W motor.
Hytrol Part Number 033.09002.
- 3) Transfer control card that is used with the E24™ Transfers.
Hytrol Part Number 033.090025.
- 4) 7A card that is selectable to power the 100W, 125W, 160W or 200W motors. This is standard when used with the PowerCube motors.
Hytrol Part Number 033.090023.

3.1) E24i (Hytrol Part Number 033.09023)

1) Cover - The cover can help reduce the severity of damage to the controller caused by foreign objects. Caution: The cover does not make the controller waterproof nor dust proof. Removal of the cover will void the warranty.

2) LED Feedback Indicators - The control board contains four (4) LED feedback indicators:

- One (1) Amber Motor Current Limiting LED
- One (1) Red Fault LED
- One (1) Green Power LED
- One (1) Red Blown Fuse LED

3) Configuration Switches - The control reads the configuration switches only when the unit is powering up. To change a setting, disconnect power, set the switch, and then reconnect the power. As shown in Figure 4A: E24i™ Control Components, the **OFF** position is to the **Left** and the **ON** position is to the **Right**.

Configuration Switch Settings:

Switch	Description:	OFF Setting:	ON Setting:
1	Rotation Direction	Counter-Clockwise	Clockwise
2	Braking Action	Zero-Motion Hold	Coast
3	Speed Selection	See Table for Operating Speeds	
4			
5			
6			

4) M8 Connector for EZLogic® - The M8 connector is already configured for use with the Hytrol EZLogic® control.

5) Optional Input-Output (I/O) Connection Header - A 4-pin Phoenix PT1.5/4-PVH-3.5 plug is supplied. If these I/O connections are not being used, leave the connector in place to avoid accidentally shorting the pins.

Note: All inputs and outputs except analog are PNP only and are active at +18 VDC or higher.

6) DC Power Input Header - The E24i™ operates off a +22 to +28 Volt DC power supply. The control reads the configuration switches only when the unit is powering up. Make the power connection only after all other connections have been made.

Optional Inputs and Outputs Pinout:

Pin	Description
1	Run (Input)
2	Reverse (Input)
3	Analog Input +
4	Running (Output)

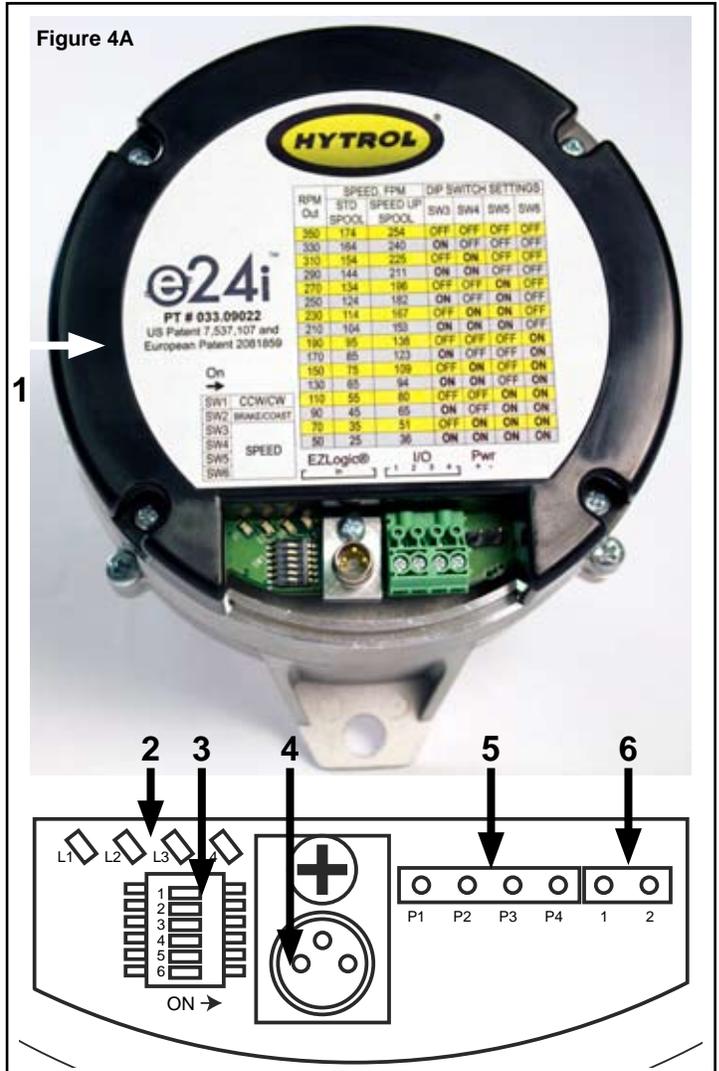
DC Power Inputs Pinout:

Pin	Signal
1	+22 to +28 Volts DC
2	DC Ground

Caution: Power must be applied with the proper polarity to avoid potentially damaging the controller.

Note: When adjacent zones are operating from separate power supplies, you should connect their DC grounds. However, do not connect the positive voltage wires from separate power supplies together.

Figure 4A



Select the Braking Action - Identify the type of braking required and then set Switch 2.

Switch 2 Settings for Braking Action:

Dynamic Braking with Zero-Motion Hold:	Coasting Stop:
OFF	ON

Select the Direction of Rotation - Identify the proper direction of rotation for the motor shaft in order to move the objects from the upstream (entry) end of the conveyor towards the downstream (exit) end of the conveyor. The direction of rotation is defined when viewed from the back side of the motor with the shaft extending away from the viewer.

- For clockwise rotation, set Switch 1 to the ON position.
- For counter-clockwise rotation, set Switch 1 to the OFF position.

Connect User I/O (Optional) - The connections listed in this section are not required but may be used when needed.

PNP Run Input - This connection is OR'ed with the EZLogic® Input. When either is active, or when both are active, the motor will run.

PNP Reverse Input - When this input is active and either the PNP Run input or the EZLogic® input is also active, the motor will run in the opposite direction from the setting on Switch 1.

Analog +(0-10V DC Input) - This input may be used to override the speed set by switches 3, 4, 5, and 6.

- If the input is below 0.5V DC, the speed defaults to that set by the switches. NOTE: The voltage drop across the return cable will cause the set voltage to vary.
- If the input is 9.0V DC or higher, the speed will be the maximum speed.
- If in the range of 1.0 to 9.0 VDC range, the speed will be proportional to the input.
- If the input is in the 0.5 to 1.0 VDC range, the speed will be the minimum speed.
- Unlike the switches, this input is dynamic and may be changed while the motors are operating.

NOTE: This input is referenced to the DC ground connected to pin 2 on the Power Input Connector.

PNP Running Output - This output is active when either the PNP Run input or the EZLogic® input is active, regardless of the condition of the PNP Reverse input. The maximum output current is 0.5 A.

Diagnostics and Troubleshooting

Feedback LED's - This motor provides four (4) LED indicators shown as item 2 in Figure 4A. The LED's are useful in diagnosing various wiring and connection problems. If power is connected, at least one LED is always illuminated or flashing. When no LED is illuminated, there is no power.

Motor LED (Amber)

- **Four Flashes in 4 seconds:** Components have overheated and the circuit is limiting the power to the motor to about half (50%) of normal. This problem corrects itself when the motor has adequately cooled. Check for mechanical obstructions.
- **Constantly ON:** Motor current is at the maximum allowed and is being electronically limited. Check for mechanical obstructions.
- **Flickering:** If the motor starts under significant load, the current may be limited briefly causing the LED to flicker. If the LED flickers constantly, this is an indication that the motor is operating at its upper limit and may never reach the full speed. This is not the cause for concern and no corrective action is required.

Fault LED (Red) - This LED is off under normal circumstances. If a problem is detected, it provides one of the following five signals:

- **One (1) flash in 4 seconds:** The motor has a hardware problem. Return it to your supplier.
- **Two (2) flashes in 4 seconds:** The input voltage is too high. Reduce the voltage.
- **Three (3) flashes in 4 seconds:** The input voltage is too low. Increase the voltage.
- **Four (4) flashes in 4 seconds:** There is a problem with the motor or commutation sensors.
- **Five (5) flashes in 4 seconds:** Control over temperature.
- **Six (6) flashes in 4 seconds:** Extreme over current.
- **Constantly ON:** The motor is stalled or the sensor is continuously blocked. Check for mechanical obstructions.

Power LED (Green)

- **Constantly ON:** Power is applied with the proper polarity and the fuse is not blown.

Blown Fuse LED (Red)

Caution: This robust next-generation fuse will not blow under normal circumstances. Inspect all wiring connections to assure that there are no short circuits.

This LED is off under normal circumstances. It illuminates constantly if the 5.0 amp internal fuse is blown and the power is applied with the proper polarity. If the blown fuse LED is illuminated, return the motor to your Integration Partner or supplier for analysis or repair. The 5.0 amp fuse is not user-accessible.

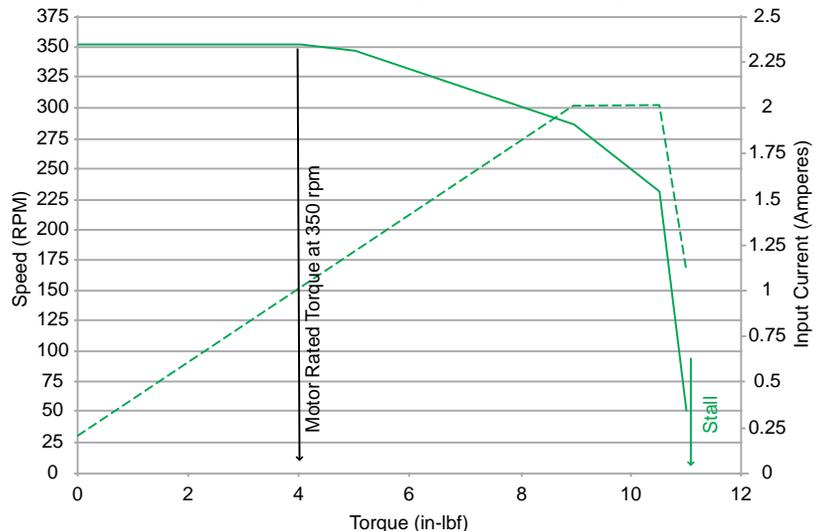
Application Information

Motor Rated Torque - The motor rated torque is 4 in-lbf as shown in the curve in the graph on page 6.

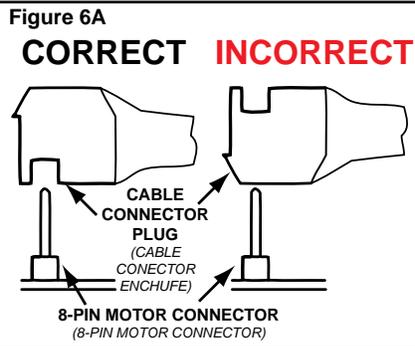
Maximum Motor Speed - The maximum speed of the motor is 350 rpm. Caution: Do not overspeed the motor. Damage may occur without external over-voltage protection.

Motor Speed and Input Current vs. Torque - The curve below shows typical E24i™ 36W24 motor speed, input current, and torque at 24V DC.

E24i™ Motor Speed and Input Current vs. Torque:



3.2) E24™ Standard Control Card (Hytrol Part Number 033.09002)



1) Motor Connection Header - Caution: Use of extension cables may cause permanent damage and will void the product warranty. UniDrive motors come with a built-in 22.0 inch (558.8 mm) or 72.00 inch (1,828.8 mm) connection cable, depending on the motor selected. (Please refer to the specific UniDrive Motor or PowerCube drive specification sheet for details.) Do not disassemble this cable. If the cable becomes damaged and on-site repairs are required, refer to the following wiring sequence from pin one (1) on the left through pin eight (8) on the right:

1	2	3	4	5	6	7	8
Green	Gray	Blue	Violet	Yellow	Brown	Red	Black

NOTE: The motor connection cable must be oriented as shown in the Figure 6A.

2) DC Power Input Header - Caution: Power must be applied with the proper polarity to avoid potentially damaging the controller.

A 2-pin Phoenix PT1.2/2-PVH-3.5 plug is supplied. The 033.09002 operates off a +22 to +28 V DC power supply. The control reads the configuration switches only when the unit is powering up. Make the power connection only after all other connections have been made.

DC Power Inputs Pinout:

Pin	Signal
1	+22 to +28 Volts DC
2	DC Ground

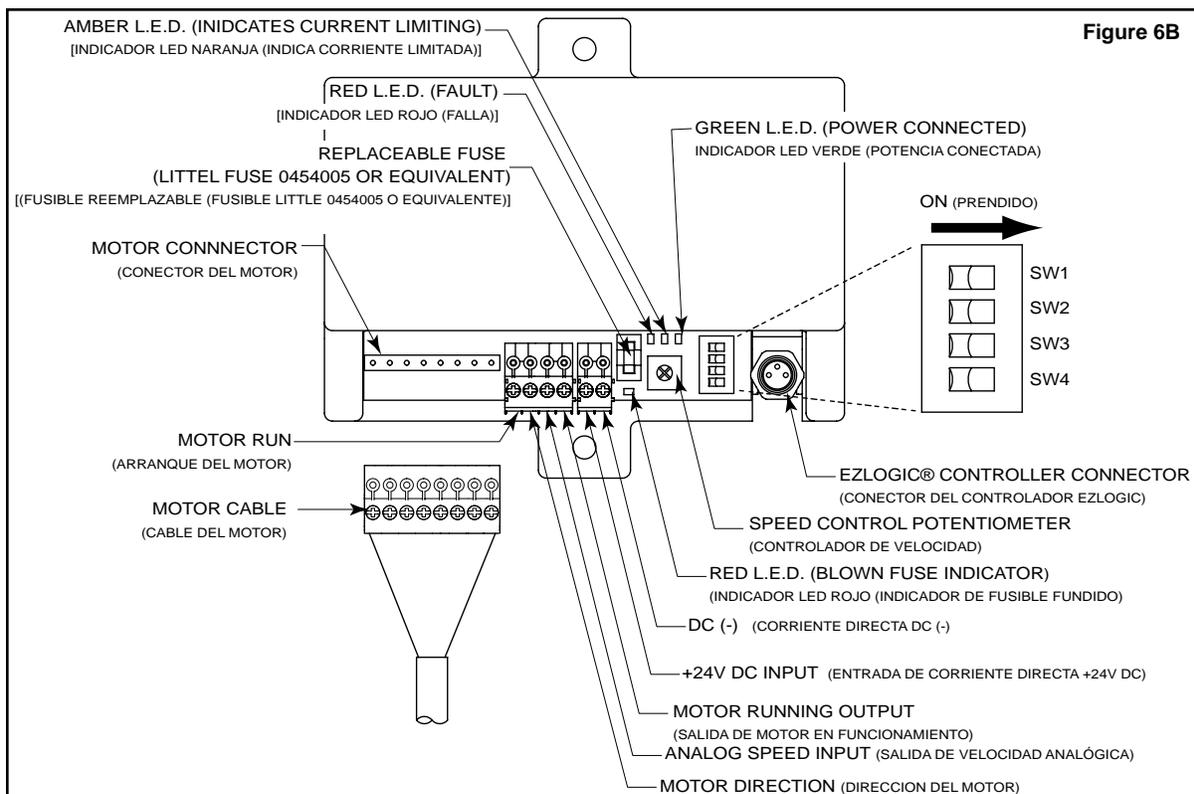
NOTE: When adjacent zones are operating from separate power supplies, you should connect their DC grounds. However, do not connect the positive voltage wires from separate power supplies together.

Optional Inputs and Outputs Pinout:

3) Optional Input-Output (I/O) Connection Header - A 4-pin Phoenix PT1.5/4-PVH-3.5 plug is supplied. If these I/O connections are not being used, leave the connector in place to avoid accidentally shorting the pins.

Pin	Description
1	Run (Input)
2	Reverse (Input)
3	Analog Input +
4	Running (Output)

NOTE: All input and outputs except analog are PNP only and are active at +18 VDC or higher.



4) Configuration Switches - The control reads the configuration switches only when the unit is powering up. To change a setting, disconnect power, set the switch, and then reconnect the power. As shown in Figure 6B. The **OFF** position is to the **Left** and the **ON** position is to the **Right**. The switches are numbered 1 through 4, with 1 being the top switch when viewing the control board as shown in the figure. They are read only at power-up, meaning that any changes to switches will not take effect until the power is cycled to the E24™ system.

Configuration Switch Settings:

Switch:	Description:	OFF Setting:	ON Setting:
1	Rotation Direction	Counter-Clockwise	Clockwise
2	Input Type	NPN	PNP
3	Braking Action	Zero-Motion Hold	Coast
4	Current Limit	1.5A	3.0A

5) LED Feedback Indicators - The control boards contains four (4) LED feedback indicators:

- One (1) Amber Motor Current Limiting LED
- One (1) Red Fault LED
- One (1) Green Power LED
- One (1) Red Blown Fuse LED

6) M8 Connector for EZLogic® - The M8 connector is already configured for use with the Hytrol EZLogic® control. This connector accepts a drive/no drive signal from an EZLogic® zone controller (when used). The connector is a male 8mm push-type connector that mates with the female connector of the EZLogic® zone controller. When the control board receives a “run” signal from the EZLogic® zone controller, it turns on the E24™ motor.

7) Mounting Plate/Heat Sink - This component is for mounting the control assembly to the conveyor frame using two 1/4 inch, or 0.25 in (6.35 mm), bolts while keeping the controller cooler.

Caution: If mounting the control on a curved section of conveyor, use washer between the mounting plate and the conveyor frame. This is to assure that the mounting plate is not distorted, causing damage to the enclosed printed circuit board assembly. For best thermal performance mount the controller on a flat surface.

8) Cover - The cover can help reduce the severity of damage to the controller caused by foreign objects. Caution: The cover does not make the controller waterproof nor dustproof. Removal of the cover will void the warranty.

The E24™ operates off a +22 to +28 Volt DC power supply. The control reads the configuration switches only when the unit is powering up. Make the power connection only after all other connections have been made.

DC Power Inputs Pinout:

Pin	Signal
1	+22 to +28 Volts DC
2	DC Ground

NOTE: When adjacent zones are operating from separate power supplies, you should connect their DC grounds. However, do not connect the positive voltage wires from separate power supplies together.

Installation Guide

Mount the Control - Mount the control in a location where the motor cable reaches the connection header without putting strain on the cable connector or the header.

Select the Current Limit - This switch selects the maximum current that the control board will allow the E24™ motor to use. When the switch is in the OFF (left) position, the current limit is set at 1.5 amps. When the switch is in the ON (right) position, the current limit is set at 3.0 amps. For most applications, the switch should be set to the OFF position

to prevent drawing too much current from the motor power supply.

Select the Braking Action - This switch is used to enable the dynamic braking feature. When the switch is in the OFF (left) position, the dynamic braking feature acts to stop motor rotation quickly when the motor is turned off. When the switch is in the ON (right) position, the motor will coast to a stop when it is turned off.

Switch 3 Settings for Braking Action:

Dynamic Braking with Zero-Motion Hold:	Coasting Stop:
OFF	ON

Select Input Type - This switch is used to set the type of input accepted by the “motor-run” input terminal and the “motor direction” input terminal. It does NOT affect the EZLogic® controller connector input. When switch 2 is in the OFF (left) position, the inputs are NPN type; that is, an input is activated by connecting the terminal to the DC(-) terminal using a jumper wire or through a switch. When switch 2 is in the ON (right) position, the inputs are PNP type; that is, an input is activated by connecting the terminal to the +24V DC terminal using a jumper wire or through a switch. PNP is recommended.

Select the Direction of Rotation - Identify the proper direction of rotation for the motor shaft in order to move the objects from the upstream (entry) end of the conveyor towards the downstream (exit) end of the conveyor. The direction of rotation is defined when viewed from the back side of the motor with the shaft extending away from the viewer.

- For clockwise rotation, set Switch 1 to the ON position.
- For counter-clockwise rotation, set Switch 1 to the OFF position.

Connect User I/O (Optional) - The connections listed in this section are not required but may be used when needed.

Run Input - This connection is OR'ed with the EZLogic® Input. When either is active, or when both are active, the motor will run.

Reverse Input - When this input is active is active and either the Run input or the EZLogic® input is also active, the motor will run in the opposite direction from the setting on Switch 1.

Analog +(0-10V DC Input) - This input may be used to override the speed set by the speed pot.

- If the input is below 0.5V DC, the speed defaults to that set by the switches. NOTE: The voltage drop across the return cable will cause the set voltage to vary.
- If the input is 9.0V DC or higher, the speed will be the maximum speed.
- If in the range of 1.0 to 9.0 VDC range, the speed will be proportional to the input.
- If the input is in the 0.5 to 1.0 VDC range, the speed will be the minimum speed.
- Unlike the switches, this input is dynamic and may be changed while the motors are operating.

NOTE: This input is referenced to the DC ground connected to pin 2 on the Power Input Connector.

Running Output - This output is active when either the Run input or the EZLogic® input is active, regardless of the condition of the Reverse input. The maximum output current is 0.5A. This output is a PNP type output. If you are using this output to run another motor (for example a zone with two motor where EZLogic® controls one motor and the output from that motor is connected to the input of the second motor), the second motor MUST be switched to PNP.

Select a Speed - The speed control potentiometer is used to vary the speed of an individual E24™ motor. Speed-up and slow-down areas may be created to gap product, provide more accurate positioning, etc.

Diagnostics and Troubleshooting

Feedback LED's - This motor provides four (4) LED indicators shown as item 2 in Figure 4A. The LED's are useful in diagnosing various wiring and connection problems. If power is connected, at least one LED is always illuminated or flashing. When no LED is illuminated, there is no power.

Motor LED (Amber)

- **Four Flashes in 4 seconds:** Components have overheated and the circuit is limiting the power to the motor to about half (50%) of normal. This problem corrects itself when the motor has adequately cooled. Check for mechanical obstructions.
- **Constantly ON:** Motor current is at the maximum allowed and is being electronically limited. Check for mechanical obstructions.
- **Flickering:** If the motor starts under significant load, the current may be limited briefly causing the LED to flicker. If the LED flickers constantly, this is an indication that the motor is operating at its upper limit and may never reach the full speed. This is not the cause for concern and no corrective action is required.

Fault LED (Red) - This LED is off under normal circumstances. If a problem is detected, it provides one of the following five signals:

- **One (1) flash in 4 seconds:** The motor has a hardware problem. Return it to your supplier.
- **Two (2) flashes in 4 seconds:** The input voltage is too high. Reduce the voltage.
- **Three (3) flashes in 4 seconds:** The input voltage is too low. Increase the voltage.
- **Four (4) flashes in 4 seconds:** There is a problem with the motor or commutation sensors.
- **Five (5) flashes in 4 seconds:** Control over temperature.
- **Six (6) flashes in 4 seconds:** Extreme over current.
- **Constantly ON:** The motor is stalled or the sensor is continuously blocked. Check for mechanical obstructions.

Power LED (Green)

- **Constantly ON:** Power is applied with the proper polarity and the fuse is not blown.

Blown Fuse LED (Red)

Caution: This robust next-generation fuse will not blow under normal circumstances. Inspect all wiring connections to assure that there are no short circuits.

This LED is off under normal circumstances. It illuminates constantly if the 5.0 amp internal fuse is blown and the power is applied with the proper polarity. If the blown fuse LED is illuminated, return the motor and the card to your Integration Partner or supplier for analysis or repair.

Card Requirements

Power Requirements

- Power In
 - 24.0V DC nominal at 3.0 Amp maximum
 - Limited to 1.5A when DIP switch 4 is OFF
 - Normal operation from 22.0 - 28.0 VDC
 - Will allow operation above 28.0 VDC but control will get hotter.
 - Will allow operation below 22.0 VDC but full speed will be unattainable
 - 29.0 + 0.2 VDC over-voltage detection (unit will cease normal operation)
 - 19.0 + 0.2 VDC under-voltage detection (unit will cease normal operation)
 - Polarity protection is provided
 - Note that the control's ground does not attach to the metal chassis; doing so assures a solid ground

but then if the power supply is reversed it's positive output

- Fuse to only be replaced with a 5A Slo-Blo Littlefuse 0454005 or equivalent
- NPN/PNP Selectable Inputs - can be either an NPN or PNP input. PNP is recommended.
 - NPN Input Signal Levels (When switch 2 is OFF)
 - Active when pulled down below 2.0 VDC
 - Need to be able to sink 3 mA
 - PNP Input Signal Levels (When switch 2 is ON)
 - Active when pulled up above 18.0 VDC
 - Need to be able to source 3 ma
 - Two input signal
 - Motor Run
 - Motor Reverse
- Analog Speed Input
 - Allow the speed to be controlled from a single point
 - Voltage range: 0-10 VDC
 - Minimum impedance presented to input: 5K
- PNP Output
 - Signal Levels
 - Sources current when active
 - Maximum current for this unprotected output is 50mA
 - A 150Ω series resistor helps the PNP output limit current draw for most situations; voltage out is thus lower as current draw increase
 - Voltage depends on input power and current draw.
 - One output signal
 - Motor Running

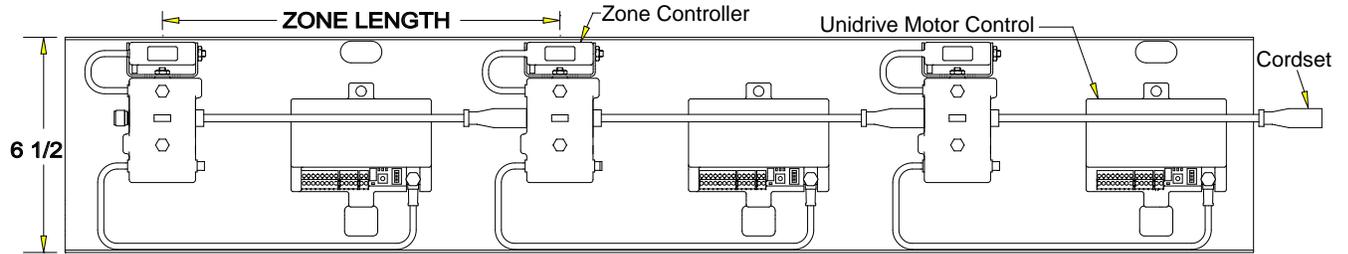
Environmental Requirements

- Temperature
 - The unit shall operate within specified limits over the range of -20 to 40°C (-4 to 120°F)
 - The unit can be stored in the range of -40 to 85°C (-40 to 185°F)
- Humidity
 - The unit shall operate within specified limits in relative humidity in the range of 20 to 90% (non-condensing)
 - The unit can be stored in the range of 5 to 95% (non-condensing)

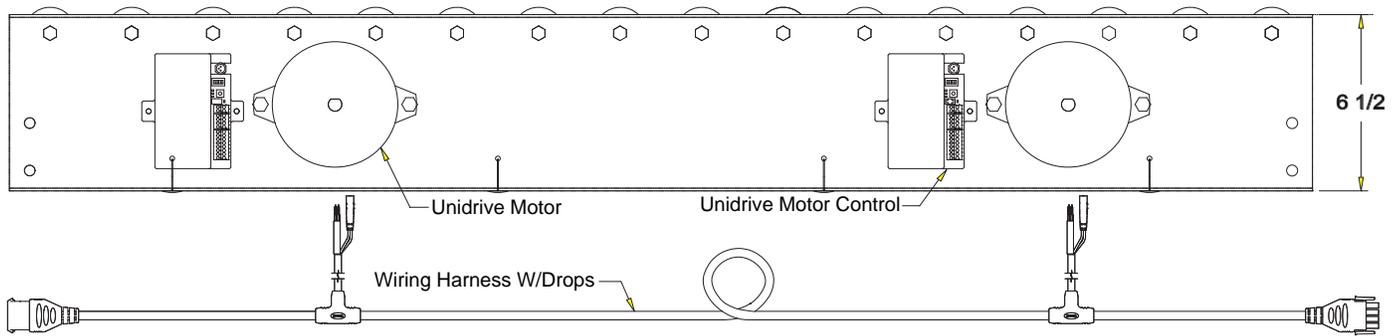
Safety - Unintended Use Considerations

- Installer
 - This product is intended for installation by qualified personnel only; although of relatively low voltage there are dangerous levels of current controlled on the board that are not protected from misplaced fingers.
 - Note that the cover makes it difficult to touch any power other than the fuse.
 - A tool will be required to tweak the pot or move the DIP switches; a plastic-tip screwdriver is recommended.
- User
 - Product shall be located away from the user such that touching of the control is not possible.
 - Should the on-board fuse require replacement, always use only that detailed in this specification.

E24EZ Connections



E24™ Connections



Trouble Shooting Model E24

The following charts list possible problems that may occur in the operation of an E24 conveyor.

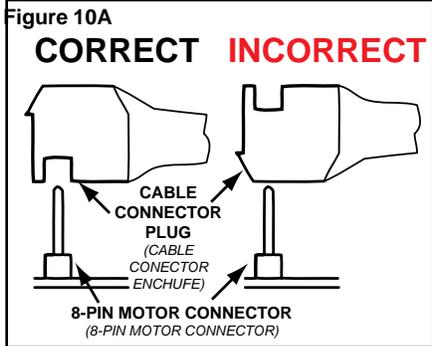
TROUBLE	CAUSE	SOLUTION
No motors on the conveyor will run.	<ol style="list-style-type: none"> 1) No AC power to the power supply unit. 2) Main power disconnect on the power supply unit is "off." 3) Main fuses blown. 4) No lights on motor/control board. 5) Board not receiving run signal 	<ol style="list-style-type: none"> 1) Check AC power. 2) Set disconnect to "on." 3) Replace fuses. 4) Check output power of power supply. 5) Check connections and insure run signal is active
Individual zone will not run.	<ol style="list-style-type: none"> 1) Motor/Control Board power pins not connected to wiring harness. 2) Motor power connector not connected to Control Board. (E24™ motor only.) 3) Blown fuse indicator "ON". (E24i™) 4) Defective control board. 5) Defective motor. 	<ol style="list-style-type: none"> 1) Connect wiring harness and pin connector to power pins on Motor/Control Board. 2) Connect motor power connector to Motor Control Board. 3) Replace motor. 4) Replace fuse. 5) Replace control board.
Zone will not restart after accumulation.	<ol style="list-style-type: none"> 1) O-ring band(s) stretched or worn. 	<ol style="list-style-type: none"> 1) Replace o-ring(s).

Trouble Shooting Model E24EZ

The following charts list possible problems that may occur in the operation of an E24EZ conveyor.

TROUBLE	CAUSE	SOLUTION
No zones on the conveyor will run.	<ol style="list-style-type: none"> 1) No AC power to the power supply unit. 2) Main power disconnect on the power supply unit is "off." 3) Main fuses blown. 4) No lights on Motor/Control Board. 5) No power to EZLogic® Zone Controller 	<ol style="list-style-type: none"> 1) Check AC power. 2) Set disconnect to "on." 3) Replace fuses. 4) Check output power of power supply. 5) Check EZLogic® connections and IOP.
Individual zone will not run.	<ol style="list-style-type: none"> 1) Motor/control board power pins not connected to wiring harness. 2) EZLogic® zone controller output cable not connected to motor/control board. 3) Motor power connector not connected to control board. (E24 motor only.) 4) Zone controller lens is dirty. 5) Reflector missing or damaged. 6) Defective EZLogic® zone controller. 7) Blown fuse indicator "ON". 8) Blown fuse indicator "ON". (E24™) 9) Defective control board. 10) Defective motor. 	<ol style="list-style-type: none"> 1) Connect wiring harness and pin connector to power pins on Control Board. 2) Connect cables. 3) Connect motor power connector to motor control board. 4) Clean lens. 5) Replace reflector. 6) Replace EZLogic® zone controller. 7) Replace motor. 8) Replace fuse. 9) Replace control board. 10) Replace motor.
Zone will not restart after accumulation.	<ol style="list-style-type: none"> 1) Zone controller lens is dirty. 2) O-ring band(s) stretched or worn. 	<ol style="list-style-type: none"> 1) Clean lens. 2) Replace o-ring(s).
Zone will not "sleep."	<ol style="list-style-type: none"> 1) Sleep feature disabled. 2) Upstream zone is blocked. 	<ol style="list-style-type: none"> 1) Enable sleep feature. 2) Unblock upstream zone.
Product will not accumulate from the discharge zone back.	<ol style="list-style-type: none"> 1) No zone stop signal to discharge zone. 	<ol style="list-style-type: none"> 1) Check input cable and signal source.

3.3) E24™ Transfer Control Card (Hytrol Part Number 033.090025)



1) Motor Connection Header - Caution: Use of extension cables may cause permanent damage and will void the product warranty. Unidrive motors come with a built-in 22.0 inch (558.8 mm) or 72.00 inch (1,828.8 mm) connection cable, depending on the motor selected. (Please refer to the specific UniDrive Motor or PowerCube drive specification sheet for details.) Do not disassemble this cable. If the cable becomes damaged and on-site repairs are required, refer to the following wiring sequence from pin one (1) on the left through pin eight (8) on the right:

1	2	3	4	5	6	7	8
Green	Gray	Blue	Violet	Yellow	Brown	Red	Black

NOTE: The motor connection cable must be oriented as shown in the Figure 10A.

2) DC Power Input Header - Caution: Power must be applied with the proper polarity to avoid potentially damaging the controller.

A 2-pin Phoenix PT1.2/2-PVH-3.5 plug is supplied. The 033.09002 operates off a +22 to +28 V DC power supply. The control reads the configuration switches only when the unit is powering up. Make the power connection only after all other connections have been made.

DC Power Inputs Pinout:

Pin	Signal
1	+22 to +28 Volts DC
2	DC Ground

NOTE: When adjacent zones are operating from separate power supplies, you should connect their DC grounds. However, do not connect the positive voltage wires from separate power supplies together.

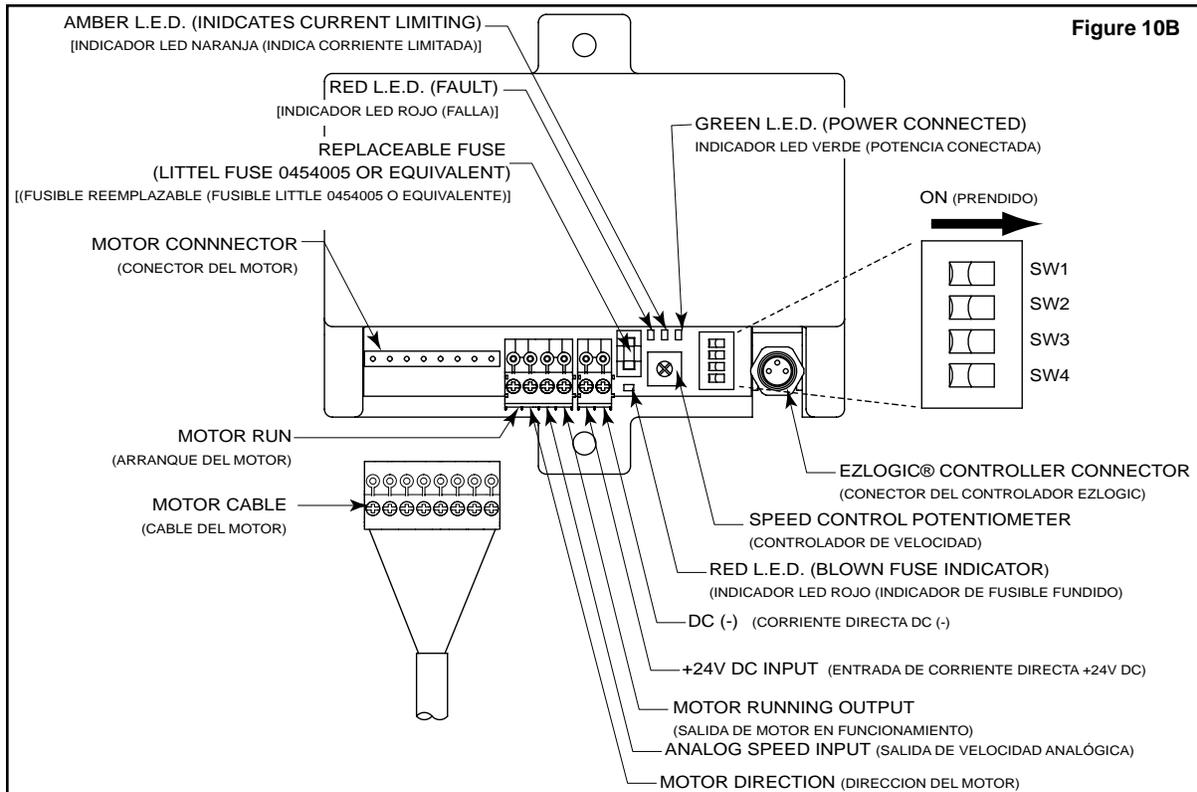
3) Optional Input-Output (I/O) Connection Header

- A 4-pin Phoenix PT1.5/4-PVH-3.5 plug is supplied. If these I/O connections are not being used, leave the connector in place to avoid accidentally shorting the pins.

Optional Inputs and Outputs Pinout:

Pin	Description
1	Run (Input)
2	Reverse (Input)
3	Analog Input +
4	Running (Output)

NOTE: All input and outputs except analog are PNP only and are active at +18 VDC or higher.



4) Configuration Switches - The control reads the configuration switches only when the unit is powering up. To change a setting, disconnect power, set the switch, and then reconnect the power. As shown in Figure 6B. The **OFF** position is to the **Left** and the **ON** position is to the **Right**. The switches are numbered 1 through 4, with 1 being the top switch when viewing the control board as shown in the figure. They are read only at power-up, meaning that any changes to switches will not take effect until the power is cycled to the E24™ system.

Configuration Switch Settings:

Switch:	Description:	OFF Setting:	ON Setting:
1	Rotation Direction	Counter-Clockwise	Clockwise
2	Input Type	NPN	PNP
3	Braking Action	Zero-Motion Hold	Coast
4	Current Limit	1.5A	4.0A

5) LED Feedback Indicators - The control boards contains four (4) LED feedback indicators:

- One (1) Amber Motor Current Limiting LED
- One (1) Red Fault LED
- One (1) Green Power LED
- One (1) Red Blown Fuse LED

6) M8 Connector for EZLogic® - The M8 connector is already configured for use with the Hytrol EZLogic® control. This connector accepts a drive/no drive signal from an EZLogic® zone controller (when used). The connector is a male 8mm push-type connector that mates with the female connector of the EZLogic® zone controller. When the control board receives a “run” signal from the EZLogic® zone controller, it turns on the E24™ motor.

7) Mounting Plate/Heat Sink - This component is for mounting the control assembly to the conveyor frame using two 1/4 inch, or 0.25 in (6.35 mm), bolts while keeping the controller cooler.

Caution: If mounting the control on a curved section of conveyor, use washer between the mounting plate and the conveyor frame. This is to assure that the mounting plate is not distorted, causing damage to the enclosed printed circuit board assembly. For best thermal performance mount the controller on a flat surface.

8) Cover - The cover can help reduce the severity of damage to the controller caused by foreign objects. Caution: The cover does not make the controller waterproof nor dustproof. Removal of the cover will void the warranty.

The E24™ operates off a +22 to +28 Volt DC power supply. The control reads the configuration switches only when the unit is powering up. Make the power connection only after all other connections have been made.

DC Power Inputs Pinout:

Pin	Signal
1	+22 to +28 Volts DC
2	DC Ground

NOTE: When adjacent zones are operating from separate power supplies, you should connect their DC grounds. However, do not connect the positive voltage wires from separate power supplies together.

Installation Guide

Mount the Control - Mount the control in a location where the motor cable reaches the connection header without putting strain on the cable connector or the header.

Select the Current Limit - This switch selects the maximum current that the control board will allow the E24™ motor to use. When the switch is in the OFF (left) position, the current limit is set at 1.5 amps. When the switch is in the ON (right) position, the current limit is set at 3.0 amps. For most applications, the switch should be set to the OFF position

to prevent drawing too much current from the motor power supply.

Select the Braking Action - This switch is used to enable the dynamic braking feature. When the switch is in the OFF (left) position, the dynamic braking feature acts to stop motor rotation quickly when the motor is turned off. When the switch is in the ON (right) position, the motor will coast to a stop when it is turned off.

Switch 3 Settings for Braking Action:

Dynamic Braking with Zero-Motion Hold:	Coasting Stop:
OFF	ON

Select Input Type - This switch is used to set the type of input accepted by the “motor-run” input terminal and the “motor direction” input terminal. It does NOT affect the EZLogic® controller connector input. When switch 2 is in the OFF (left) position, the inputs are NPN type; that is, an input is activated by connecting the terminal to the DC(-) terminal using a jumper wire or through a switch. When switch 2 is in the ON (right) position, the inputs are PNP type; that is, an input is activated by connecting the terminal to the +24V DC terminal using a jumper wire or through a switch. PNP is recommended.

Select the Direction of Rotation - Identify the proper direction of rotation for the motor shaft in order to move the objects from the upstream (entry) end of the conveyor towards the downstream (exit) end of the conveyor. The direction of rotation is defined when viewed from the back side of the motor with the shaft extending away from the viewer.

- For clockwise rotation, set Switch 1 to the ON position.
- For counter-clockwise rotation, set Switch 1 to the OFF position.

Connect User I/O (Optional) - The connections listed in this section are not required but may be used when needed.

Run Input - This connection is OR'ed with the EZLogic® Input. When either is active, or when both are active, the motor will run.

Reverse Input - When this input is active is active and either the Run input or the EZLogic® input is also active, the motor will run in the opposite direction from the setting on Switch 1.

Analog +(0-10V DC Input) - This input may be used to override the speed set by the speed pot.

- If the input is below 0.5V DC, the speed defaults to that set by the switches. NOTE: The voltage drop across the return cable will cause the set voltage to vary.
- If the input is 9.0V DC or higher, the speed will be the maximum speed.
- If in the range of 1.0 to 9.0 VDC range, the speed will be proportional to the input.
- If the input is in the 0.5 to 1.0 VDC range, the speed will be the minimum speed.
- Unlike the switches, this input is dynamic and may be changed while the motors are operating.

NOTE: This input is referenced to the DC ground connected to pin 2 on the Power Input Connector.

Running Output - This output is active when either the Run input or the EZLogic® input is active, regardless of the condition of the Reverse input. The maximum output current is 0.5A. This output is a PNP type output. If you are using this output to run another motor (for example a zone with two motor where EZLogic® controls one motor and the output from that motor is connected to the input of the second motor), the second motor MUST be switched to PNP.

Select a Speed - The speed control potentiometer is used to vary the speed of an individual E24™ motor. Speed-up and slow-down areas may be created to gap product, provide more accurate positioning, etc.

Diagnostics and Troubleshooting

Feedback LED's - This motor provides four (4) LED indicators shown as item 2 in Figure 4A. The LED's are useful in diagnosing various wiring and connection problems. If power is connected, at least one LED is always illuminated or flashing. When no LED is illuminated, there is no power.

Motor LED (Amber)

- **Four Flashes in 4 seconds:** Components have overheated and the circuit is limiting the power to the motor to about half (50%) of normal. This problem corrects itself when the motor has adequately cooled. Check for mechanical obstructions.
- **Constantly ON:** Motor current is at the maximum allowed and is being electronically limited. Check for mechanical obstructions.
- **Flickering:** If the motor starts under significant load, the current may be limited briefly causing the LED to flicker. If the LED flickers constantly, this is an indication that the motor is operating at its upper limit and may never reach the full speed. This is not the cause for concern and no corrective action is required.

Fault LED (Red) - This LED is off under normal circumstances. If a problem is detected, it provides one of the following five signals:

- **One (1) flash in 4 seconds:** The motor has a hardware problem. Return it to your supplier.
- **Two (2) flashes in 4 seconds:** The input voltage is too high. Reduce the voltage.
- **Three (3) flashes in 4 seconds:** The input voltage is too low. Increase the voltage.
- **Four (4) flashes in 4 seconds:** There is a problem with the motor or commutation sensors.
- **Five (5) flashes in 4 seconds:** Control over temperature.
- **Six (6) flashes in 4 seconds:** Extreme over current.
- **Constantly ON:** The motor is stalled or the sensor is continuously blocked. Check for mechanical obstructions.

Power LED (Green)

- **Constantly ON:** Power is applied with the proper polarity and the fuse is not blown.

Blown Fuse LED (Red)

Caution: This robust next-generation fuse will not blow under normal circumstances. Inspect all wiring connections to assure that there are no short circuits.

This LED is off under normal circumstances. It illuminates constantly if the 5.0 am internal fuse is blown and the power is applied with the proper polarity. If the blown fuse LED is illuminated, return the motor to your Integration Partner or supplier for analysis or repair. The 5.0 amp fuse is not user-accessible.

Card Requirements

Power Requirements

- Power In
 - 24.0V DC nominal at 3.0 Amp maximum
 - Limited to 1.5A when DIP switch 4 is OFF
 - Normal operation from 22.0 - 28.0 VDC
 - Will allow operation above 28.0 VDC but control will get hotter.
 - Will allow operation below 22.0 VDC but full speed will be unattainable
 - 29.0 + 0.2 VDC over-voltage detection (unit will cease normal operation)
 - 19.0 + 0.2 VDC under-voltage detection (unit will cease normal operation)

- Polarity protection is provided
 - Note that the control's ground does not attach to the metal chassis; doing so assures a solid ground but then if the power supply is reversed it's positive output
- Fuse to only be replaced with a 5A Slo-Blo Littlefuse 0454005 or equivalent
- NPN/PNP Selectable Inputs - can be either an NPN or PNP input. PNP is recommended.
 - NPN Input Signal Levels (When switch 2 is OFF)
 - Active when pulled down below 2.0 VDC
 - Need to be able to sink 3 mA
 - PNP Input Signal Levels (When switch 2 is ON)
 - Active when pulled up above 18.0 VDC
 - Need to be able to source 3 ma
 - Two input signal
 - Motor Run
 - Motor Reverse
- Analog Speed Input
 - Allow the speed to be controlled from a single point
 - Voltage range: 0-10 VDC
 - Minimum impedance presented to input: 5K
- PNP Output
 - Signal Levels
 - Sources current when active
 - Maximum current for this unprotected output is 50mA
 - A 150Ω series resistor helps the PNP output limit current draw for most situations; voltage out is thus lower as current draw increase
 - Voltage dependents on input power and current draw.
 - One output signal
 - Motor Running

Environmental Requirements

- Temperature
 - The unit shall operate within specified limits over the range of -20 to 40°C (-4 to 120°F)
 - The unit can be stored in the range of -40 to 85°C (-40 to 185°F)
- Humidity
 - The unit shall operate within specified limits in relative humidity in the range of 20 to 90% (non-condensing)
 - The unit can be stored in the range of 5 to 95% (non-condensing)

Safety - Unintended Use Considerations

- Installer
 - This product is intended for installation by qualified personnel only; although of relatively low voltage there are dangerous levels of current controlled on the board that are not protected from misplaced fingers.
 - Note that the cover makes it difficult to touch any power other than the fuse.
 - A tool will be required to tweak the pot or move the DIP switches; a plastic-tip screwdriver is recommended.
- User
 - Product shall be located away from the user such that touching of the control is not possible.
 - Should the on-board fuse require replacement, always use only that detailed in this specification.

Trouble Shooting Model E24

The following charts list possible problems that may occur in the operation of an E24 conveyor.

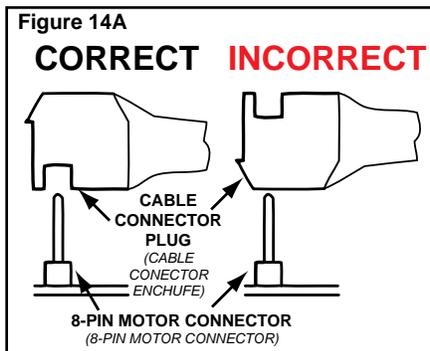
TROUBLE	CAUSE	SOLUTION
No motors on the conveyor will run.	<ol style="list-style-type: none"> 1) No AC power to the power supply unit. 2) Main power disconnect on the power supply unit is "off." 3) Main fuses blown. 4) No lights on motor/control board. 5) Board not receiving run signal 	<ol style="list-style-type: none"> 1) Check AC power. 2) Set disconnect to "on." 3) Replace fuses. 4) Check output power of power supply. 5) Check connections and insure run signal is active
Individual zone will not run.	<ol style="list-style-type: none"> 1) Motor/Control Board power pins not connected to wiring harness. 2) Motor power connector not connected to Control Board. (E24™ motor only.) 3) Blown fuse indicator "ON". (E24i™) 4) Defective control board. 5) Defective motor. 	<ol style="list-style-type: none"> 1) Connect wiring harness and pin connector to power pins on Motor/Control Board. 2) Connect motor power connector to Motor Control Board. 3) Replace motor. 4) Replace fuse. 5) Replace control board.
Zone will not restart after accumulation.	<ol style="list-style-type: none"> 1) O-ring band(s) stretched or worn. 	<ol style="list-style-type: none"> 1) Replace o-ring(s).

Trouble Shooting Model E24EZ

The following charts list possible problems that may occur in the operation of an E24EZ conveyor.

TROUBLE	CAUSE	SOLUTION
No zones on the conveyor will run.	<ol style="list-style-type: none"> 1) No AC power to the power supply unit. 2) Main power disconnect on the power supply unit is "off." 3) Main fuses blown. 4) No lights on Motor/Control Board. 5) No power to EZLogic® Zone Controller 	<ol style="list-style-type: none"> 1) Check AC power. 2) Set disconnect to "on." 3) Replace fuses. 4) Check output power of power supply. 5) Check EZLogic® connections and IOP.
Individual zone will not run.	<ol style="list-style-type: none"> 1) Motor/control board power pins not connected to wiring harness. 2) EZLogic® zone controller output cable not connected to motor/control board. 3) Motor power connector not connected to control board. (E24 motor only.) 4) Zone controller lens is dirty. 5) Reflector missing or damaged. 6) Defective EZLogic® zone controller. 7) Blown fuse indicator "ON". 8) Blown fuse indicator "ON". (E24™) 9) Defective control board. 10) Defective motor. 	<ol style="list-style-type: none"> 1) Connect wiring harness and pin connector to power pins on Control Board. 2) Connect cables. 3) Connect motor power connector to motor control board. 4) Clean lens. 5) Replace reflector. 6) Replace EZLogic® zone controller. 7) Replace motor. 8) Replace fuse. 9) Replace control board. 10) Replace motor.
Zone will not restart after accumulation.	<ol style="list-style-type: none"> 1) Zone controller lens is dirty. 2) O-ring band(s) stretched or worn. 	<ol style="list-style-type: none"> 1) Clean lens. 2) Replace o-ring(s).
Zone will not "sleep."	<ol style="list-style-type: none"> 1) Sleep feature disabled. 2) Upstream zone is blocked. 	<ol style="list-style-type: none"> 1) Enable sleep feature. 2) Unblock upstream zone.
Product will not accumulate from the discharge zone back.	<ol style="list-style-type: none"> 1) No zone stop signal to discharge zone. 	<ol style="list-style-type: none"> 1) Check input cable and signal source.

3.4) E24™ High Performance Card (Hytrol Part Number 033.090023)



1) Motor Connection Header - Caution: Use of extension cables may cause permanent damage and will void the product warranty. Unidrive motors come with a built-in 22.0 inch (558.8 mm) or 72.00 inch (1,828.8 mm) connection cable, depending on the motor selected. (Please refer to the specific UniDrive Motor or PowerCube drive specification sheet for details.) Do not disassemble this cable. If the cable becomes damaged and on-site repairs are required, refer to the following wiring sequence from pin one (1) on the left through pin eight (8) on the right:

1	2	3	4	5	6	7	8
Green	Gray	Blue	Violet	Yellow	Brown	Red	Black

NOTE: The motor connection cable must be oriented as shown in the Figure 14A.

2) DC Power Input Header - Caution: Power must be applied with the proper polarity to avoid potentially damaging the controller.

A 2-pin Phoenix PT1.2/2-PVH-3.5 plug is supplied. The 033.090023 operates off a +22 to +28 V DC power supply. The control reads the configuration switches only when the unit is powering up. Make the power connection only after all other connections have been made.

DC Power Inputs Pinout:

Pin	Signal
1	+22 to +28 Volts DC
2	DC Ground

NOTE: When adjacent zones are operating from separate power supplies, you should connect their DC grounds. However, do not connect the positive voltage wires from separate power supplies together.

3) Optional Input-Output (I/O) Connection Header

- A 6-pin Phoenix PT1.5/6-PVH-3.5 plug is supplied. If these I/O connections are not being used, leave the connector in place to avoid accidentally shorting the pins.

Optional Inputs and Outputs Pinout:

Pin	Description
1	Run (Input)
2	Reverse (Input)
3	Running (Output)
4	Analog Input +
5	DC Ground
6	Shunt Input

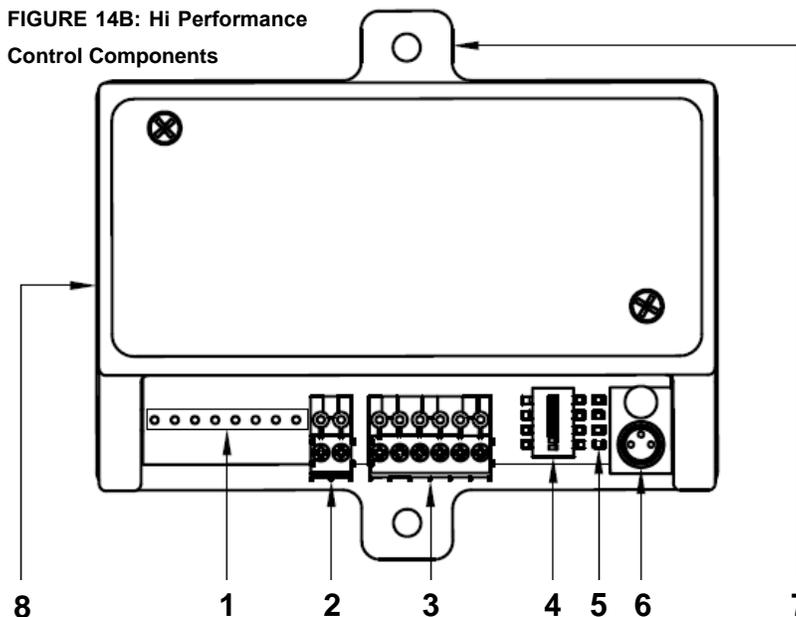
NOTE: All input and outputs except analog are PNP only and are active at +18 VDC or higher.

4) Configuration Switches

- The switches are numbered 1 through 8, with 1 being the top switch when viewing the control board as shown in the figure.

The OFF position is to the Left and the ON position is to the Right. Switches 1, 2, 7, & 8 are read only when the unit is powering up. To change a setting, disconnect power, set the switch, and then reconnect the power. Switches 3 – 6 change the speed and can be changed and read while the unit is powered up.

FIGURE 14B: Hi Performance Control Components



Configuration Switch Settings:

SW:	Description:	OFF Setting:	ON Setting:
1	Rotation Direction	Counter-Clockwise	Clockwise
2	Braking Action	Zero-Motion Hold	Coast
3	Speed Selection	Operating Speeds	
4			
5			
6			
7	Motor Selection	Motor Selection Switch Settings	
8			

5) LED Feedback Indicators - The control boards contains four (4) LED feedback indicators:
 One (1) Amber Motor Current Limiting LED
 One (1) Red Fault LED
 One (1) Green Power LED
 One (1) Red Blown Fuse LED

6) M8 Connector for EZLogic® - The M8 connector is already configured for use with the Hytrol EZLogic® control. This connector accepts a drive/no drive signal from an EZLogic® zone controller (when used). The connector is a male 8mm push-type connector that mates with the female connector of the EZLogic® zone controller. When the control board receives a “run” signal from the EZLogic® zone controller, it turns on the E24™ motor.

7) Mounting Plate/Heat Sink - This component is for mounting the control assembly to the conveyor frame using two 1/4 inch, or 0.25 in (6.35 mm), bolts while keeping the controller cooler.

Caution: If mounting the control on a curved section of conveyor, use washer between the mounting plate and the conveyor frame. This is to assure that the mounting plate is not distorted, causing damage to the enclosed printed circuit board assembly. For best thermal performance mount the controller on a flat surface.

8) Cover - The cover can help reduce the severity of damage to the controller caused by foreign objects. Caution: The cover does not make the controller waterproof nor dustproof. Removal of the cover will void the warranty.

The E24™ operates off a +22 to +28 Volt DC power supply. The control reads the configuration switches only when the unit is powering up. Make the power connection only after all other connections have been made.

NOTE: When adjacent zones are operating from separate power supplies, you should connect their DC grounds. However, do not connect the positive voltage wires from separate power supplies together.

Installation Guide

Mount the Control - Mount the control in a location where the motor cable reaches the connection header without putting strain on the cable connector or the header.

Select the Motor - Select the motor you will be using. Properly match the control settings to the motor in use to deliver the best and most predictable performance.

In addition to the standard 100 watt UniDrive motor, this control provides maximum performance with our 125 watt, 160 watt, 200 watt motors at their higher speeds. You can also use this control with an optional shunt regulator that enables regenerative braking mode without creating excess voltage on the power supply line.

Motor Selection Switch Settings:

SW 7:	SW 8:	Motor:
OFF	OFF	100W24
ON	OFF	125W24
OFF	ON	160W24
ON	ON	200W24

Select a Speed - Four switches determine the operating speed, making it simple to match speeds in multiple zones. The actual speed selected also depends on the motor that you selected in the previous step, so set those switches first.

There is also an option to use a 0-10 V DC input for remote, dynamic speed adjustment while the system is running.

Switches:				Speed Selection (RPM):			
SW 3:	SW 4:	SW 5:	SW 6:	100W24	125W24	160W24	200W24
OFF	OFF	OFF	OFF	280	350	450	560
ON	OFF	OFF	OFF	265	331	426	530
OFF	ON	OFF	OFF	250	312	402	500
ON	ON	OFF	OFF	235	293	378	470
OFF	OFF	ON	OFF	220	274	354	440
ON	OFF	ON	OFF	205	255	330	410
OFF	ON	ON	OFF	190	236	306	380
ON	ON	ON	OFF	175	217	282	350
OFF	OFF	OFF	ON	160	198	258	320
ON	OFF	OFF	ON	145	179	234	290
OFF	ON	OFF	ON	130	160	210	260
ON	ON	OFF	ON	115	141	186	230
OFF	OFF	ON	ON	100	122	162	200
ON	OFF	ON	ON	85	103	138	170
OFF	ON	ON	ON	70	84	114	140
ON	ON	ON	ON	55	65	90	110

Select the Braking Action - This switch is used to enable the dynamic braking feature. When the switch is in the OFF (left) position, the dynamic braking feature acts to stop motor rotation quickly when the motor is turned off. When the switch is in the ON (right) position, the motor will coast to a stop when it is turned off. If an optional Shunt Regulator is connect, the control will default to regenerative braking.

Switch 2 Settings for Braking Action:

Dynamic Braking with Zero-Motion Hold:	Coasting Stop:
OFF	ON

Select the Direction of Rotation - Identify the proper direction of rotation for the motor shaft in order to move the objects from the upstream (entry) end of the conveyor towards the downstream (exit) end of the conveyor. The direction of rotation is defined when viewed from the back side of the motor with the shaft extending away from the viewer.

- For clockwise rotation, set Switch 1 to the ON position.
- For counter-clockwise rotation, set Switch 1 to the OFF position.

Connect User I/O (Optional) - The connections listed in this section are not required but may be used when needed.

PNP Run Input - This connection is OR'ed with the EZLogic® Input. When either is active, or when both are active, the motor will run.

PNP Reverse Input - When this input is active is active and either the PNP Run input or the EZLogic® input is also active, the motor will run in the opposite direction from the setting on Switch 1.

Analog +(0-10V DC Input) - This input may be used to override the speed set by switches 4,5, and 6.

- If the input is below 0.5V DC, the speed defaults to that set by the switches. NOTE: The voltage drop across the return cable will cause the set voltage to vary.

- If the input is 9.0V DC or higher, the speed will be the maximum speed.
- If in the range of 1.0 to 9.0 VDC range, the speed will be proportional to the input.
- If the input is in the 0.5 to 1.0 VDC range, the speed will be the minimum speed.
- Unlike the switches, this input is dynamic and may be changed while the motors are operating.

NOTE: This input is referenced to the DC ground connected to pin 2 on the Power Input Connector.

PNP Running Output - This output is active when either the PNP Run input or the EZLogic® input is active, regardless of the condition of the PNP Reverse input.

Shunt Enable Input - This input is only to be used if an external Shunt Regulator is attached. Refer to the Shunt Regulator installation guide.

DC Ground - The point is common to the DC ground on pin 2 of the Power Input Connector, should it be required for reference.

Diagnostics and Troubleshooting

Feedback LED's - This control provides four (4) LED indicators shown as item 2 in Figure 15B. The LED's are useful in diagnosing various wiring and connection problems. If power is connected, at least one LED is always illuminated or flashing. When no LED is illuminated, there is no power.

Blown Fuse (Red) - Caution: This robust next-generation fuse will not blow under normal circumstances. Inspect all wiring connections to assure that there are no short circuits.

This LED is off under normal circumstances. It illuminates constantly if the 10.0 amp internal fuse is blown and the power is applied with the proper polarity. The 10.0 amp fuse on the board is not user-accessible. If the blown fuse LED is illuminated, return the board to your Integration Partner or supplier for analysis or repair.

Fault LED (Red) - This LED is off under normal circumstances. If a problem is detected, it provides one of the following five signals:

- **One (1) flash in 4 seconds:** The motor has a hardware problem. Return it to your supplier.
- **Two (2) flashes in 4 seconds:** The input voltage is too high. Reduce the voltage.
- **Three (3) flashes in 4 seconds:** The input voltage is too low. Increase the voltage.
- **Four (4) flashes in 4 seconds:** There is a problem with the motor or commutation sensors or motor cable or connection. Check to see that the cable is not damaged and that all of the wires are secure. If the cable has been cut or the wires disconnected, refer to the Motor Connection Header.
- **Five (5) flashes in 4 seconds:** Control Board over temperature shut down.
- **Six (6) flashes in 4 seconds:** Extreme over current.
- **Constantly ON:** The motor is stalled or the sensor is continuously blocked. Check for mechanical obstructions.

Motor LED (Amber)

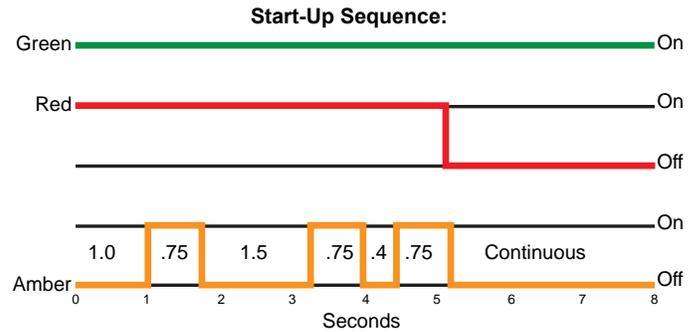
- **Four Flashes in 4 seconds:** Components have overheated and the circuit is limiting the power to the motor to about half (50%) of normal. This problem corrects itself when the motor has adequately cooled. Check for mechanical obstructions.
- **Constantly ON:** Motor current is at the maximum allowed and is being electronically limited. Check for mechanical obstructions.
- **Flickering:** If the motor starts under significant load, the current may be limited briefly causing the LED to flicker. If the LED flickers constantly, this is an indication that the motor

is operating at its upper limit and may never reach the full speed. This is not the cause for concern and no corrective action is required.

Power LED (Green)

- **Constantly ON:** Power is applied with the proper polarity as long as the fuse is not blown.

Firmware Version Display - Three (3) of the feedback LED's are used to communicate the firmware revision of the control assembly during the start-up sequence. Each time that power is applied to the board, the green (power) and red (fault) LEDs will turn on immediately. After 1.0 second, the amber LED will flash on for 0.75 seconds followed by an off period. An off period of 1.5 seconds represents a decimal point separating major revisions from minor revisions.



The example sequence above represents firmware revision 1.2. When the red fault LED turns off, the start-up sequence has ended and normal operation begins.

Card Requirements

Power Requirements

- Power In
 - 24.0V DC nominal at selected motor max amperage
 - Normal operation from 22.0 - 28.0 VDC
 - Will allow operation above 28.0 VDC but control will get hotter.
 - Will allow operation below 22.0 VDC but full speed will be unattainable
 - 29.0 + 0.2 VDC over-voltage detection (unit will cease normal operation)
 - 19.0 + 0.2 VDC under-voltage detection (unit will cease normal operation)
 - Polarity protection is provided
 - Note that the control's ground does not attach to the metal chassis; doing so assures a solid ground but then if the power supply is reversed it's positive output
 - Fuse is a non-replaceable 10A fuse.
- PNP Inputs
 - PNP Input Signal Levels
 - Active when pulled up above 18.0 VDC
 - Need to be able to source 3 mA
 - Two input signal
 - Motor Run
 - Motor Reverse
- Analog Speed Input
 - Allow the speed to be controlled from a single point
 - Voltage range: 0-10 VDC
 - Minimum impedance presented to input: 5K

From	0.8	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5
To	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	10.0
Speed (%)	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

- PNP Output
 - Signal Levels
 - Sources current when active
 - Maximum current for this unprotected output is 50mA
 - A 150Ω series resistor helps the PNP output limit current draw for most situations; voltage out is thus lower as current draw increase
 - Voltage dependents on input power and current draw.
 - One output signal
 - Motor Running

Environmental Requirements

- Temperature
 - The unit shall operate within specified limits over the range of -20 to 40°C (-4 to 120°F)
 - The unit can be stored in the range of -40 to 85°C (-40 to 185°F)
- Humidity
 - The unit shall operate within specified limits in relative humidity in the range of 20 to 90% (non-condensing)
 - The unit can be stored in the range of 5 to 95% (non-condensing)

Safety - Unintended Use Considerations

- Installer
 - This product is intended for installation by qualified personnel only; although of relatively low voltage there are dangerous levels of current controlled on the board that are not protected from misplaced fingers.
 - Note that the cover makes it difficult to touch any power other than the fuse.
 - A tool will be required to tweak the pot or move the DIP switches; a plastic-tip screwdriver is recommended.
 - Should the on-board fuse require replacement, always use only that detailed in this specification.
- User
 - Product shall be located away from the user such that touching of the control is not possible.

a higher wattage motor would help. If you introduce a heavier product to the conveyor and the 100W24 motor won't move it, or it struggles to move it, getting a higher wattage motor is not going to help. The ONLY time this is not true is when you are using a speed up spool. Speed up spools are larger in diameter, so, in effect, you are losing torque capacity when compared to the standard spool. So, if a 100W24 motor with a speed up spool barely moves a product, then a higher wattage motor with a smaller spool may move it just fine. Keep in mind that typically, our standard o-rings will be the limiting factor.

PowerCube's are E24™ motors coupled to a right angle worm gear reducer. The 125W24, 5:1 ratio PowerCube (907.0310) is standard on our 199CRE24EZ and 199PVE24EZ conveyors. The 124W24, 7.5:1 ratio PowerCube (907.0311) is standard on our 25CRE24EZ and 25PVE24EZ conveyors. Other PowerCube's are available, if needed. Higher wattage motors (160W and 200W) are available for higher speeds, and other ratios (up to 30:1) are available for more torque. Just a note: the 100W motor is not available in a PowerCube configuration.

Motor Control Cards - The 033.09002 motor control card is standard for use with the 100W24 motor. It is selectable from a 1.5A max setting to a 3.0A max setting. As standard, it is set on the 1.5A setting. Only in certain cases, such as inclines or using stronger/stiffer o-rings, would we need to us the 3.0A setting.

The 033.090025 motor control card is commonly referred to as our Transfer Card. As you guessed, it is standard for use on our E24™ transfers using the 100W24 motor. It is selectable from 1.5A max setting to a 4.0A max setting. It is typically set to the 4.0A setting for transfers. Transfers typically require more torque to get the product out of the way quickly to help with through put. As stated earlier, torque is proportional to amperage, thus this card allows all the amps the 100W24 motor is rated for, to get maximum torque to accelerate the product as quickly as possible.

The 033.090023 motor control card is known as the 7A card. It is required on all higher wattage motors and PowerCubes. This card is selectable to be used with all of our motors.

Just a note on sizing power supplies. When using the 36W24 (033.09022) motor or any 100W24 motor with a card set on the 1.5A setting on a 190E24 conveyor, we assume a 1 amp draw per motor. Why use 1 amp instead of 1.5 amp? Because we have tested and confirmed that with our standard o-ring, 1 amp is all the motor requires. The o-ring will start slipping before it gets up to 1.5 amps. Also, count all transfers as using 4 amps and when using higher wattage motors, use the value of max amp draw of the card. See chart below for the 7A card (033.090023).

	100W24	125W24	160W24	200W24
Amp Draw	4.0A	5.0A	6.0A	7.0A

What is Standard?

Motors - The 36W24 (033.09022) motor is standard on our 190E24 horizontal conveyor line. It only has 4 in-lb of torque, but that is similar to what the 100W24 motor has at 1.5A. It has been determined that the limiting factor on driving the 190E24 is the o-rings and not the motor, thus the o-ring will slip before the motor stalls. This motor has the advantage of having the speed range of the 100W24 and the 125W24 motors and to also have a built in motor control card. Because it has a built in motor control card, the height of the motor is higher, thus we are only offering, as standard, the 36W24 on conveyor with the motors mounted on the inside. When motors need to be mounted on the outside on a 190E24, then the 100W24 (033.09001) motor is used because it can stay within the flanges of the conveyor. The 100W24 motor is also used on incline 190E24 conveyor and units that use stronger/stiffer o-rings. We do this more as a precaution than anything else. Using the 100W24 motor and the standard motor control card (033.09002) gives us the option to bump the amps up to 3.0 to give additional torque, if needed.

The 100W24 motor (033.090217) motor is standard on the E24™ transfers. This motor is different than the motor mentioned above. This motor has a 1.8" long round keyed shaft, where the above motor has a 2.5" long "D" shaft.

The 125W24, 160W24, and the 200W24 motors are all optional for all E24™ applications. These motors provide faster speeds; they do not offer more torque. In other words, if you are currently moving a product with a 100W24 motor but now you need to move it faster, then

Global Speed Controller

The E24™ Global Speed Controller (GSC) is capable of sending a speed reference input to multiple E24™ version 2.0 control cards from one source. The GSC supplies an analog signal ranging from 1 to 10 VDC. This signal is passed through the brown wire of the E24™ wiring harness. Each GSC can control the speed of up to 20 control cards. The GSC is connected between the power supply and the first wiring harness. The GSC is equipped with an on/off switch and a speed control knob.

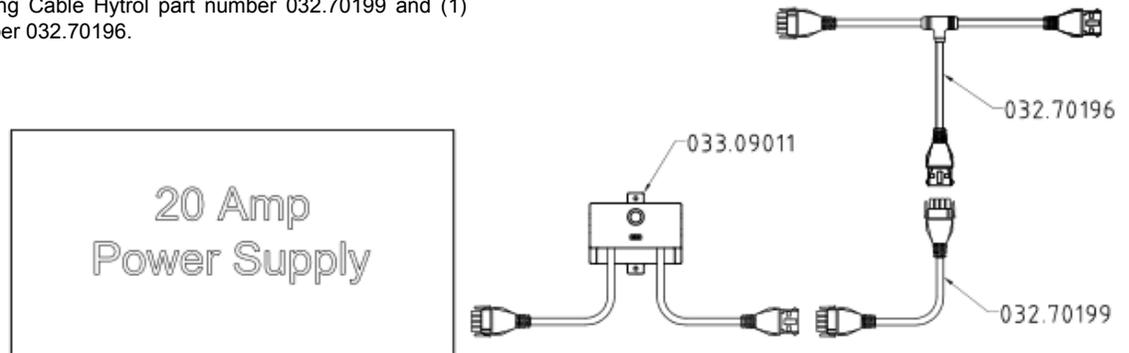
Power Switch - When the switch is in the 'off' position, the motor will revert to the on board speed potentiometer. When the switch is in the 'on' position, the motor speed will be determined by the GSC.

Control Knobs - Rotate clockwise to increase speed, counter-clockwise to decrease speed with 16 voltage steps in-between. Maximum speed is 275 RPM, minimum speed is 55 RPM.

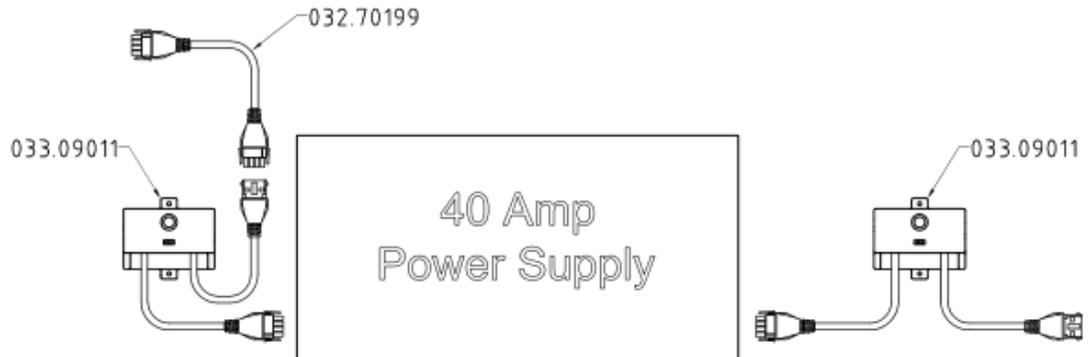
Cable Connections - Male connector plugs into the power supply or female end of a wiring harness. Female end plugs into a t-cable or the first wiring harness that is to be controlled by the GSC. The speed control is only sent out of the female end of the cable.

E24™ Card Connection - Connect the brown wire located in the wiring harness to input terminal number 3 of each control card desired to respond to the GSC.

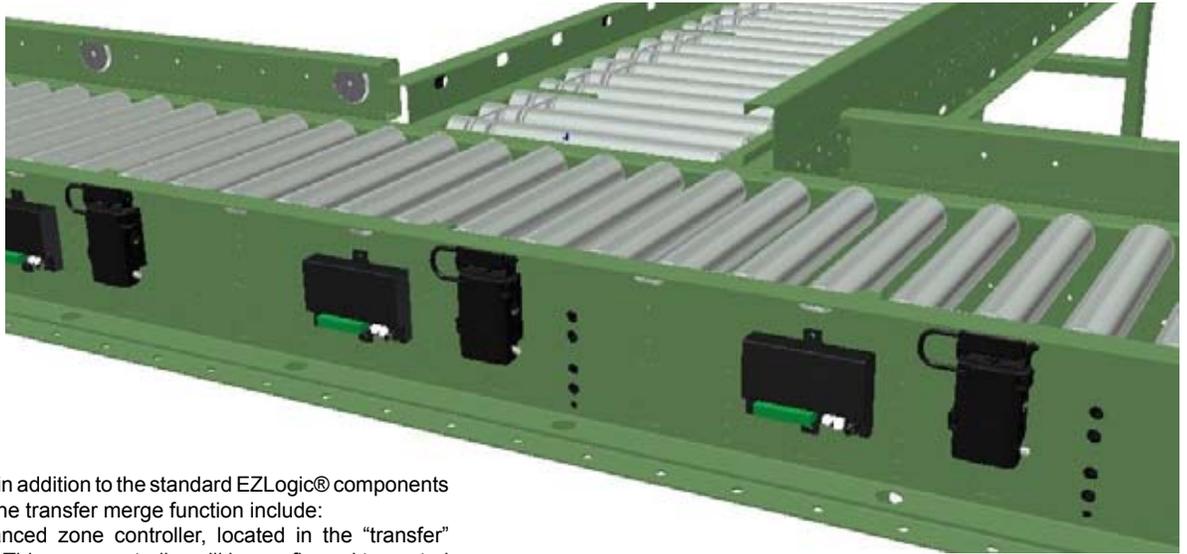
20 Amp Power Supply - Requires (1) Global Speed Controller Hytrol part number 033.09011, (1) Gender Changing Cable Hytrol part number 032.70199 and (1) Power T-Cable Hytrol part number 032.70196.



40 Amp Power Supply - Requires (2) Global Speed Controllers Hytrol part number 033.09011 and (1) Gender Changing Cable Hytrol part number 032.70199.



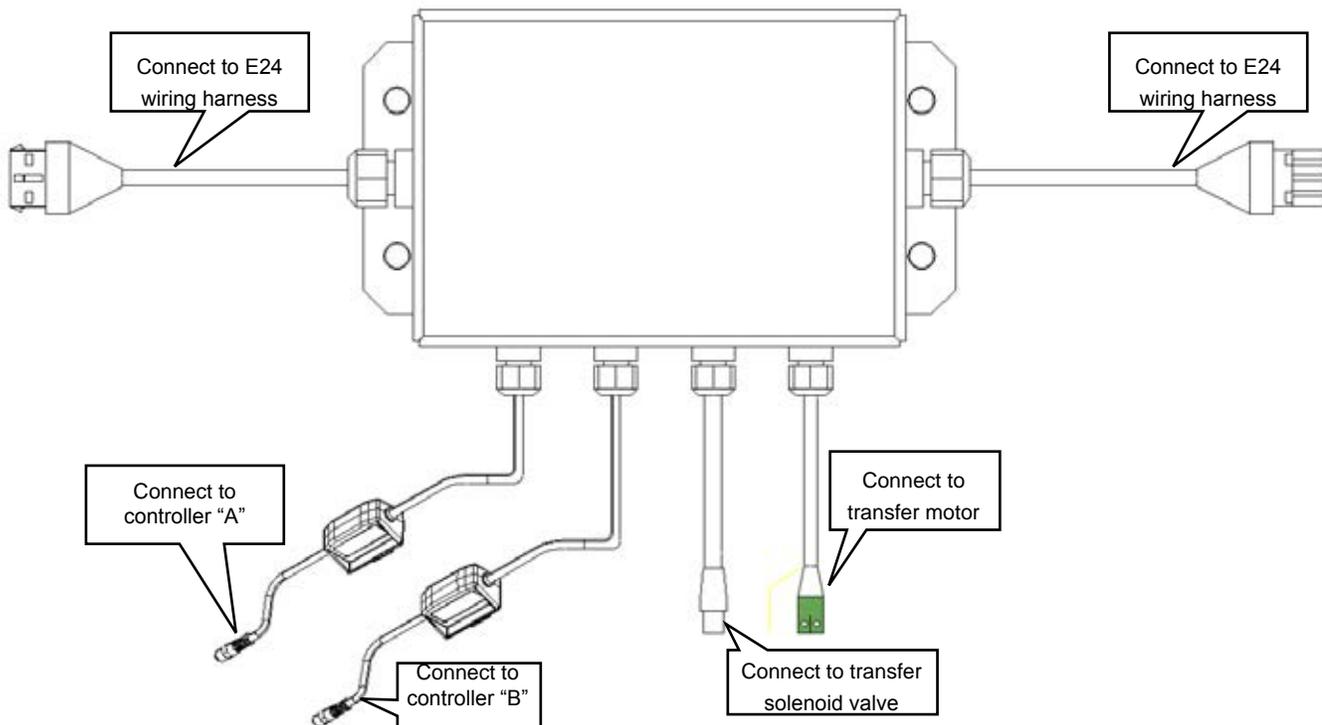
E24EZ Transfer Merge EZLogic® Control Function



Components Required

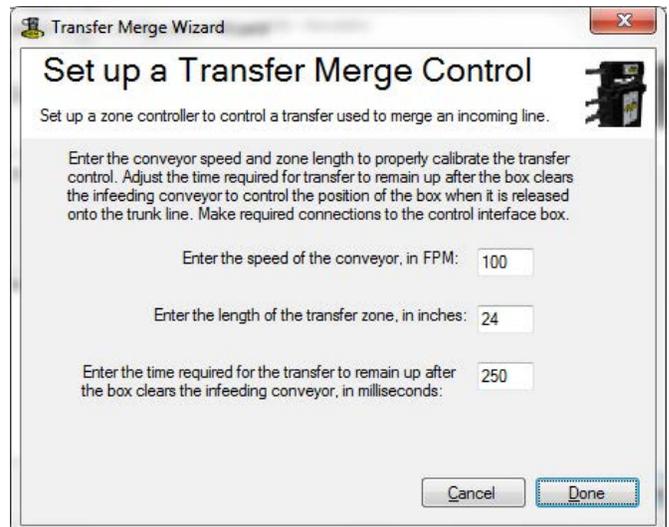
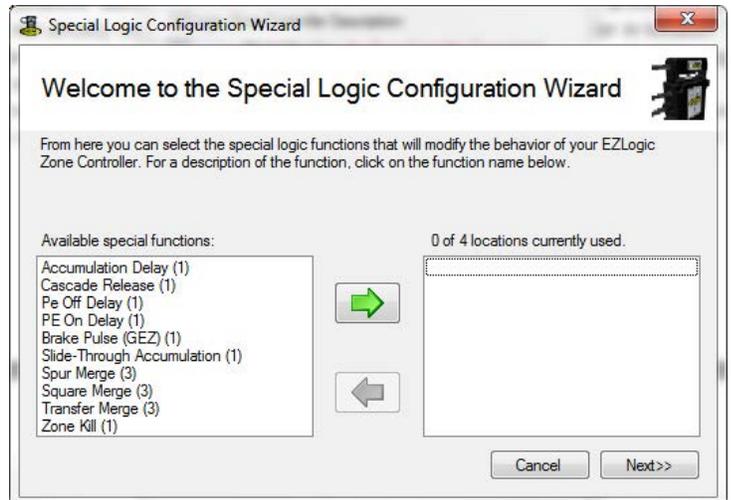
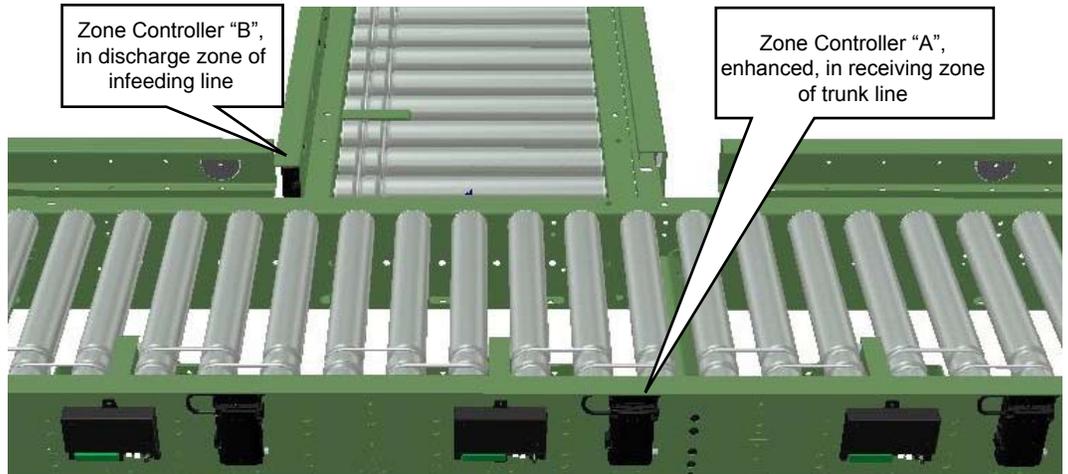
The components required (in addition to the standard EZLogic® components normally supplied) to use the transfer merge function include:

- (1) EZLogic® enhanced zone controller, located in the “transfer” zone of the trunk line. This zone controller will be configured to control the transfer merge. This controller may be the 032.505 unitized retro-reflective zone controller or the 032.506 unitized diffuse zone controller. If the retro-reflective type is used, a small rectangular reflector must also be used, mounted between the conveyor rollers in the area of the “mouth” of the infeeding line.
- A Hytrol-provided “transfer merge connection kit,” Hytrol part number TC-001504. This kit is used to provide all of the control and power connections required by EZLogic® and the transfer motor and lift system. This kit is provided pre-assembled. The installer is only required to mount the enclosure to the conveyor frame and make all required plug-in connections. No additional wiring is required.



Installation and configuration of the transfer merge control includes the following steps:

1. Mount the connection kit near the transfer so that all required connections are within reach of the provided cables and connectors.
2. Connect the E24 wiring harness connector on the connection kit box to the wiring harness of the conveyor. NOTE: This may require other wiring harness components, depending on your conveyor layout. Contact the Hytrol factory if you have questions about required cabling.
3. Connect the connector labeled "To Transfer Motor" to the power connection pins of the E24 transfer motor control board, located on the transfer base.
4. Plug the connector labeled "To Transfer Solenoid Valve" to the solenoid air valve of the transfer, located on the transfer base.
5. Connect to the zone controller in the discharge zone of the feeding conveyor (location "B" in the illustration) using an EZLogic® USB programming cable and Genesis™ 2.0 software running on a Windows PC.
6. In Genesis™, click the "edit" button on the main screen, then double-click in the "Auxiliary Input Mode" edit box. This will bring up the "Auxiliary Input Wizard" screen. Make sure "zone stop" is selected, then click "Next." On the next screen, select "Zone Stop signal must be active for a carton to run ("failsafe")" and click the "Finish" button.
7. Disconnect the programming cable from the controller and plug the connector labeled "connect to controller B" to the auxiliary port.
8. If it is not already installed, install an EZLogic® enhanced zone controller in the "transfer" zone of the trunk line (location "A" in the illustration). Connect to the enhanced zone controller in location "A" using the EZLogic® USB programming cable and Genesis™ 2.0 software.
9. In Genesis™, click the "Edit" button on the main screen, then double-click in the "Special Logic Function" edit box. This will bring up the "Special Logic Configuration Wizard" screen. NOTE: If the "Special Logic Configuration" does not look like the one shown to the right, you may be connected to a standard zone controller.
10. Select "Transfer Merge" from the list on the left of the wizard, then click on the green arrow in the center of the wizard. The "Transfer Merge" function will now appear in the list on the right. Click "Next", then click "Continue". This will bring up the "Transfer Merge" wizard.
11. The "Transfer Merge" wizard asks for three parameters. The first two are determined by the mechanical configuration of the conveyor: the speed of the conveyor, in feet per minute, and the length of the zones in the trunk line, in inches. The third parameter allows you to adjust the amount of time that is allowed for a box released from the infeeding line to clear the infeeding line before the transfer is allowed to return to the lowered position. This timer is used to adjust the "drop point" of the box onto the trunk line. This value is entered in milliseconds of delay required. Usually the default value of 250 milliseconds is sufficient.
12. Once you have entered the required parameters, click "Done." On the main Genesis™ screen, the "Special Logic Function" will be listed as "Transfer Merge," highlighted in red to indicate that the function has not yet been written to the zone controller. In addition, the "Auxiliary Input Mode" will be changed to "Configurable Logic Input" and the "Auxiliary Output Mode" will be changed to "Configurable Logic Output (NO)", also highlighted in red. These settings are necessary for proper operation of the transfer merge function and are automatically changed by the wizard. DO NOT ALTER THESE SETTINGS. Click "Done" to write the changes to the zone controller.
13. Disconnect the programming cable from zone controller "A". Connect the other connector labeled "connect to controller A" to zone controller "A".

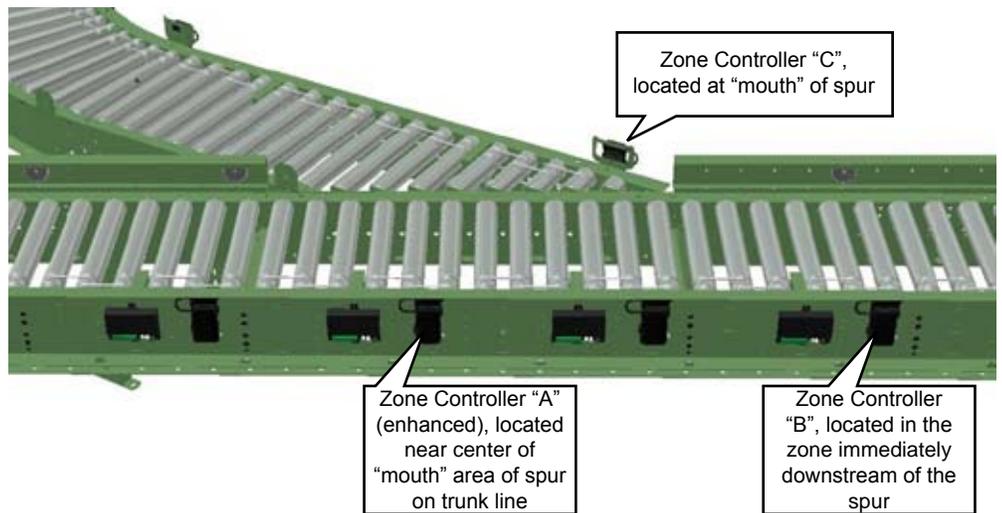
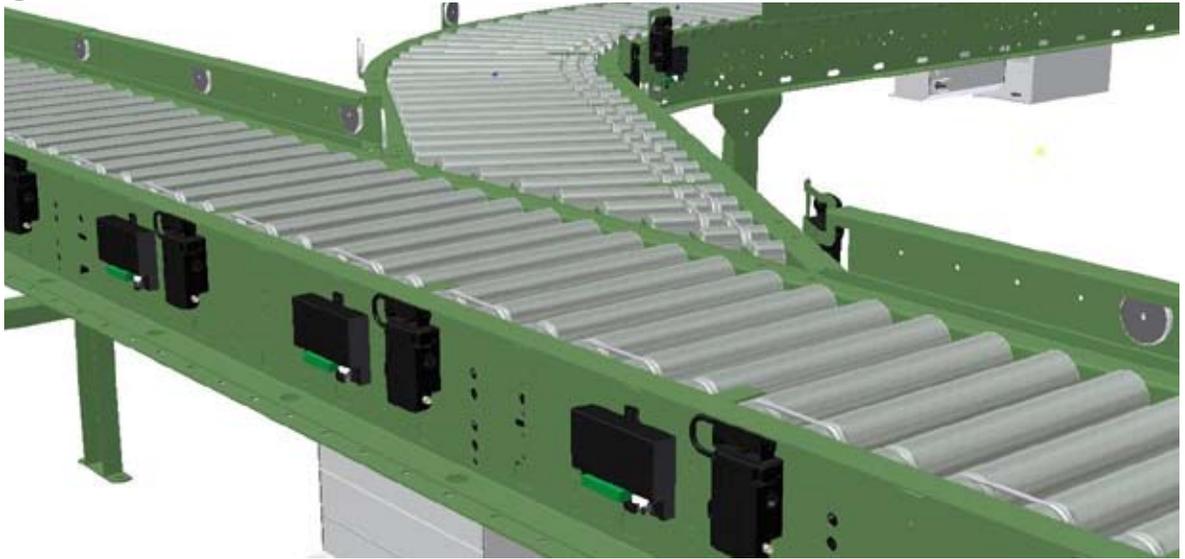


Spur Merge EZLogic® Control Function

Components Required

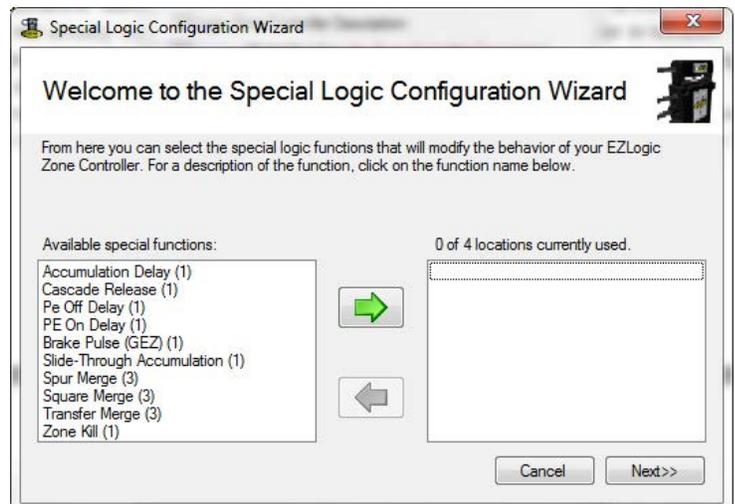
The components required (in addition to the standard EZLogic® components normally supplied) to use the spur merge function include:

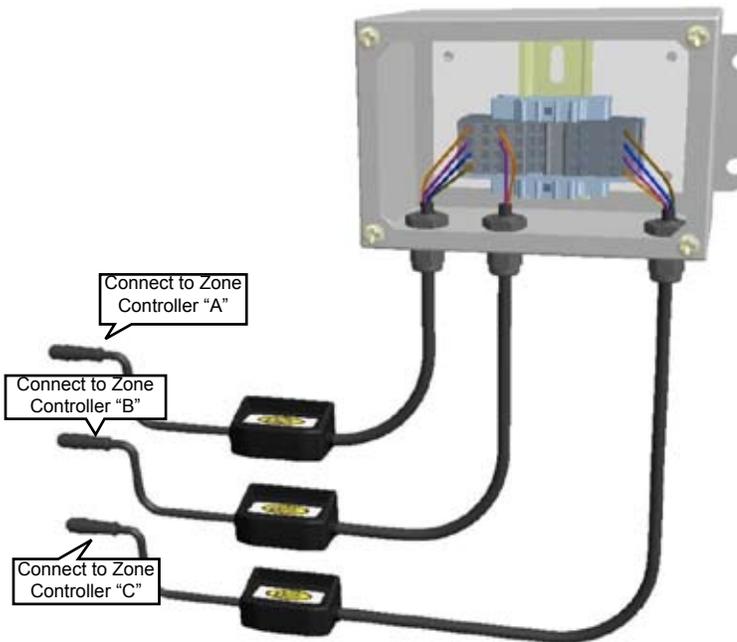
- (1) EZLogic® enhanced zone controller, located in the “spur” zone of the trunk line (see illustration). This zone controller will be configured to control the transfer merge. This controller may be the 032.505 unitized retro-reflective zone controller or the 032.506 unitized diffuse zone controller. If the retro-reflective type is used, a small rectangular reflector must also be used, mounted between the conveyor rollers in the area of the “mouth” of the infeeding line.
- (1) Hytrol-provided connection kit (Hytrol part number TC-001506). This kit utilizes the auxiliary ports on the zone controllers. The kit consists of three EZLogic® Auxiliary I/O modules, a junction box with terminals to provide the proper wiring connections, and a mounting bracket and hardware. The illustration shows the connection kit. Not shown are the mounting bracket and hardware. The cover of the junction box is also not shown so that the terminals and connections can be seen. Please note, however, that all connections are pre-wired from the Hytrol factory. Removal of the cover is not required to install or configure the connection kit.



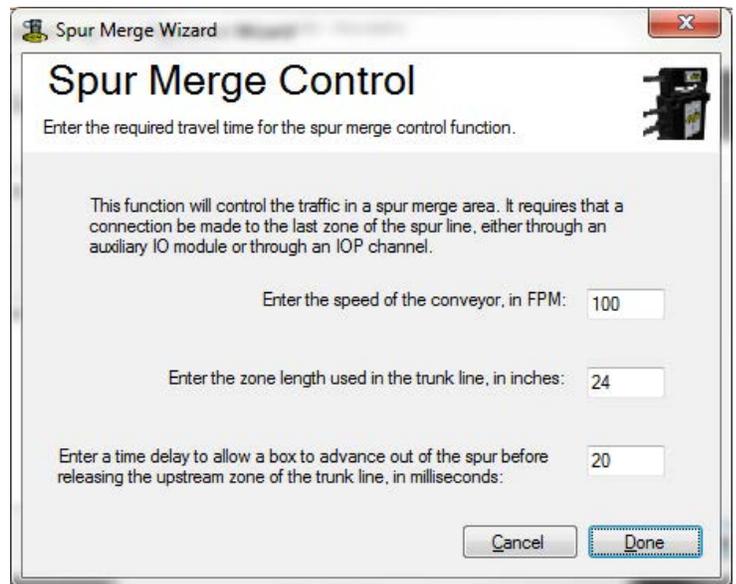
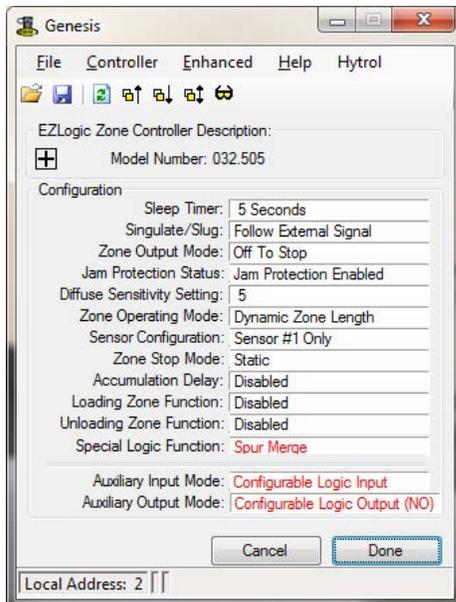
Installation and configuration of the spur merge control using the connection kit method includes the following steps:

1. Mount the connection kit junction box to the trunk line conveyor on the spur side.
2. Plug the auxiliary I/O adapters to the auxiliary ports of zone controllers “B” and “C” as shown in the illustrations above and below. Do not connect to zone controller “A” at this time.
3. If it is not already installed, install an EZLogic® enhanced zone controller in location “A” using an EZLogic® USB programming cable and Genesis™ 2.0 software running on a Windows PC.
4. In Genesis™, click the “Edit” button on the main screen, then double-click in the “Special Logic Function” edit box. This will bring up the “Special Logic Configuration Wizard” screen. NOTE: If the “Special Logic Configuration” does not look like the one shown to the right, you may be connected to a standard zone controller.
5. Select “Spur Merge” from the list on the left of the wizard, then click on the green arrow in the center of the wizard. The “Spur Merge” function will now appear in the list on the right. Click “Next”, then click “Continue”. This will bring up the “Spur Merge” wizard.





6. The “Spur Merge” wizard asks for three parameters. The first two are determined by the mechanical configuration of the conveyor: the speed of the conveyor, in feet per minute, and the length of the zones in the trunk line, in inches. The third parameter allows you to adjust the amount of time that is allowed for a box released from the spur line to clear the spur line before releasing the boxes on the trunk line. This timer is used to compensate for the length of a spur if the last zone of the spur is several inches away from the trunk line. It may also be used to give the spur line “priority” by allowing more boxes to be released from the spur line before the trunk line is allowed to release. This value is entered in milliseconds of delay required.
7. Once you have entered the required parameters, click “Done.” On the main Genesis™ screen, the “Special Logic Function” will be listed as “Spur Merge,” highlighted in red to indicate that the function has not yet been written to the zone controller. In addition, the “Auxiliary Input Mode” will be changed to “Configurable Logic Input” and the “Auxiliary Output Mode” will be changed to “Configurable Logic Output (NO)”, also highlighted in red. These settings are necessary for proper operation of the spur merge function and are automatically changed by the wizard. DO NOT ALTER THESE SETTINGS. Click “Done” to write the changes to the zone controller.
8. Disconnect the programming cable from zone controller “A”. Connect the proper auxiliary I/O adapter to zone controller “A”.
9. Connect the programming cable to zone controller “B”. Select “Edit”.
10. Double-click the “Auxiliary Output Mode” edit box. This will bring up the “Auxiliary Output Mode” wizard. Select “Zone Blocked and Stopped” from the list. Click “Next”. Then click “Finish”. On the main screen, click “Done”.
11. Disconnect the programming cable from zone controller “B”. Connect the proper auxiliary I/O adapter to zone controller “B”.



Square Merge EZLogic® Control Function

Components Required

The components required (in addition to the standard EZLogic® components normally supplied) to use the square merge function include:

- (1) EZLogic® enhanced zone controller, located in the “receiving” zone of the trunk line. This controller may be the 032.505 unitized retro-reflective zone controller or the 032.506 unitized diffuse zone controller. If the retro-reflective type is used, a small rectangular reflector must also be used, mounted between the conveyor rollers in the area of the “mouth” of the infeeding line.
- (2) EZLogic® auxiliary I/O modules (032.532)

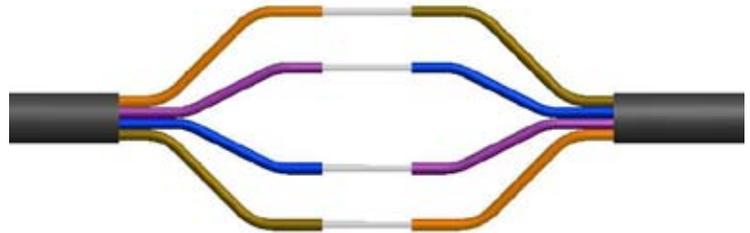


Installation and configuration of the spur merge control using the connection kit method includes the following steps:

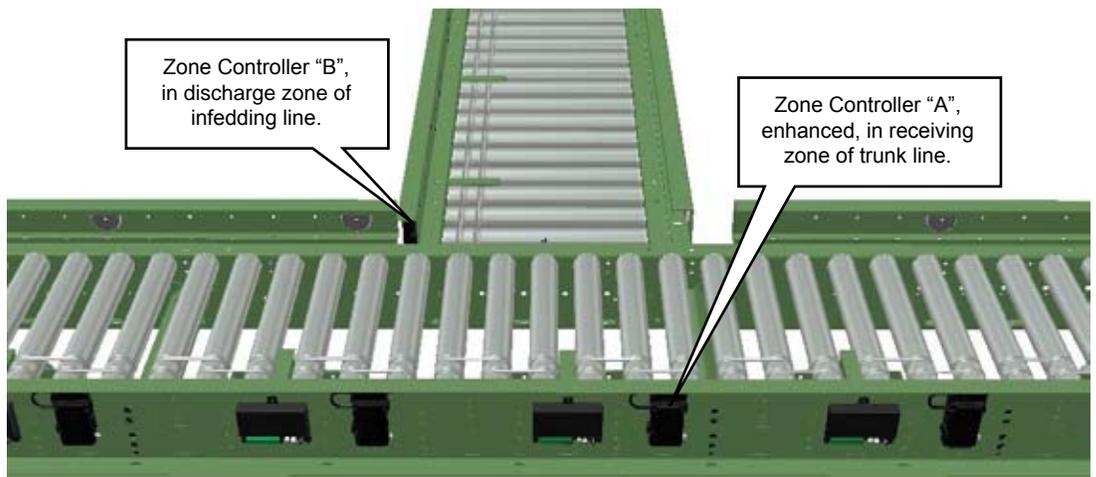
1. The two auxiliary I/O modules must be wired together as follows:



- a. The orange wire from one auxiliary I/O module must be wired to the brown wire of the other auxiliary I/O module. This must be done in both directions; in other words, the orange wire of one must be wired to the brown wire of the other, and vice versa.
- b. The violet wire from one auxiliary I/O module must be wired to the blue wire of the other auxiliary I/O module. This must be done in both directions; in other words, the violet wire of one must be wired to the blue wire of the other, and vice versa.
- c. The white and gray wires of the two auxiliary I/O modules are not used, and may be cut short or otherwise managed.

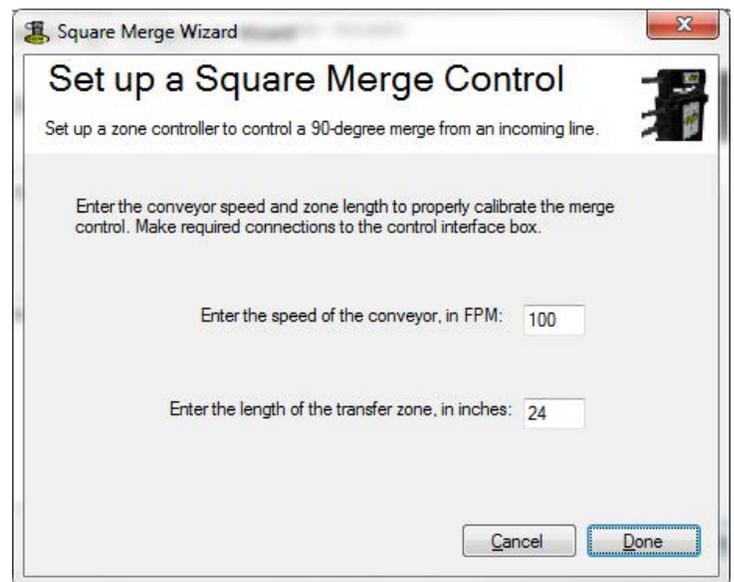
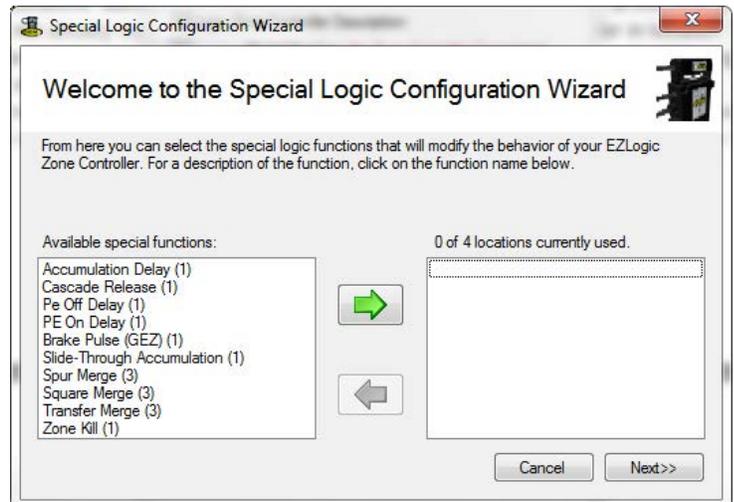


2. The result of the above steps should be similar to what is shown in the illustration. NOTE: These connections may be performed using crimp-on style wire splices, by wiring them to terminals in a junction box (not supplied), etc.
3. Connect to the zone controller in the discharge zone of the feeding conveyor (location “B” in the illustration) using an EZLogic® USB programming cable and Genesis™ 2.0 software running on a Windows PC.
4. In Genesis™, click the “edit” button on the main screen, then double-click in the “Auxiliary Input Mode” edit box. This will bring up the “Auxiliary Input Wizard” screen. Make sure “zone stop” is selected, then click “Next.” On the next screen, select “Zone Stop signal must be active for a carton to run (“failsafe”)” and click the “Finish” button.
5. Disconnect the programming cable from the controller and plug one end of the previously-wired auxiliary I/O module assembly to the auxiliary port.
6. If it is not already installed, install an EZLogic® enhanced zone controller in the “receiving” zone of the trunk line (location “A” in the illustration). Connect to the enhanced zone controller in location “A” using the EZLogic® USB programming cable and Genesis™ 2.0 software.
7. In Genesis™, click the “Edit” button on the main screen, then double-click in the “Special Logic Function” edit box. This will bring up the “Special Logic Configuration Wizard” screen.
NOTE: If the “Special Logic Configuration does not look like the one shown, you may be connected to a standard zone controller.
8. Select “Square Merge” from the list on the left of the wizard, then click on the green arrow in the center of the wizard. The “Square Merge” function will now appear in the list on the right. Click “Next”, then click “Continue”. This will bring up the “Square Merge” wizard.
9. The “Square Merge” wizard asks for two parameters. These are

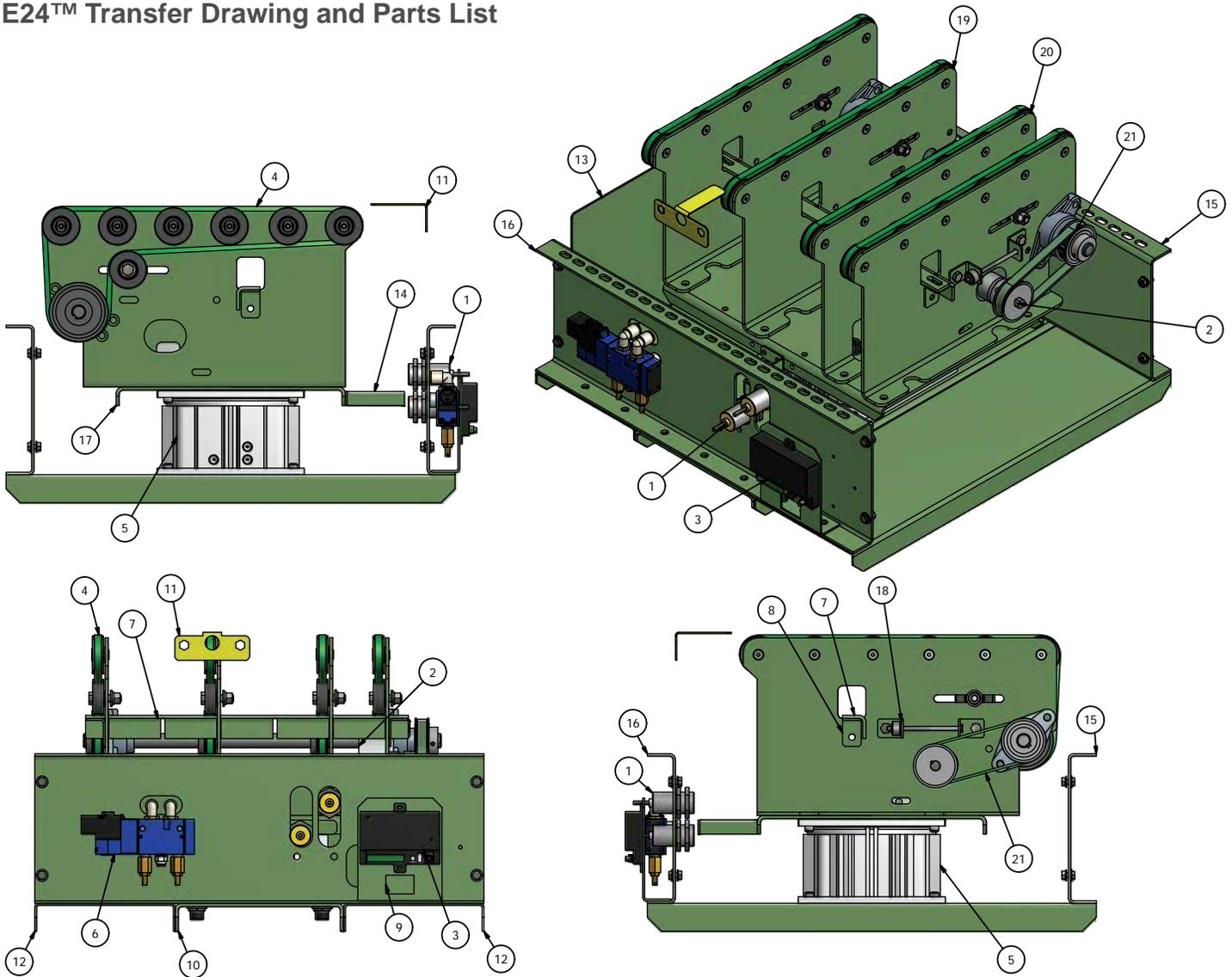


determined by the mechanical configuration of the conveyor: the speed of the trunk conveyor, in feet per minute, and the length of the receiving zone in the trunk line, in inches.

10. Once you have entered the required parameters, click "Done." On the main Genesis™ screen, the "Special Logic Function" will be listed as "Square Merge," highlighted in red to indicate that the function has not yet been written to the zone controller. In addition, the "Auxiliary Input Mode" will be changed to "Configurable Logic Input" and the "Auxiliary Output Mode" will be changed to "Configurable Logic Output (NO)", also highlighted in red. These settings are necessary for proper operation of the square merge function and are automatically changed by the wizard. DO NOT ALTER THESE SETTINGS. Click "Done" to write the changes to the zone controller.
11. Disconnect the programming cable from zone controller "A". Connect the other connector from the previously-wired auxiliary I/O module assembly to zone controller "A".

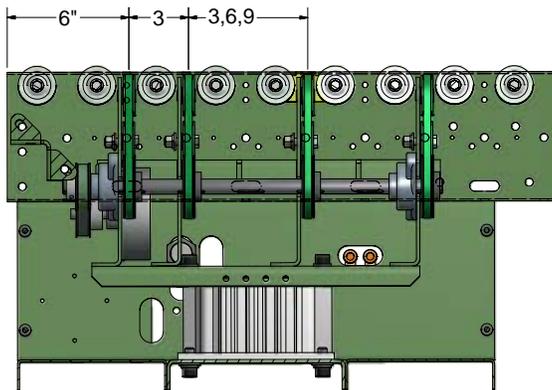
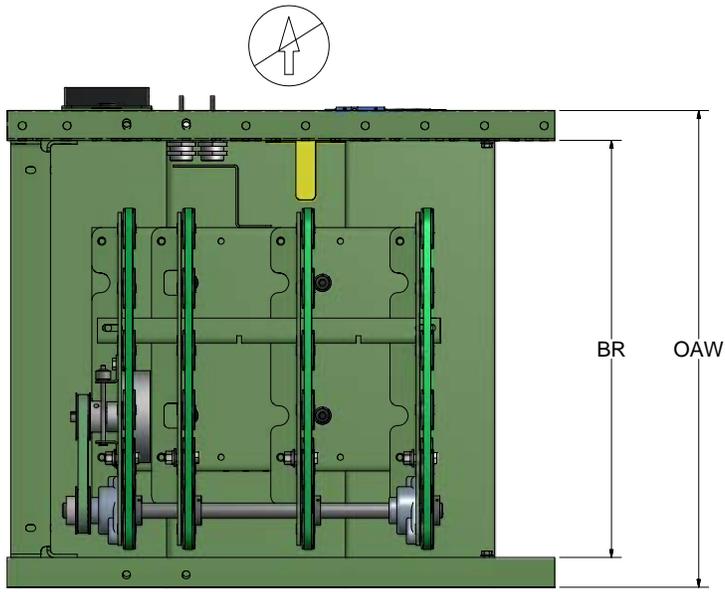


E24™ Transfer Drawing and Parts List

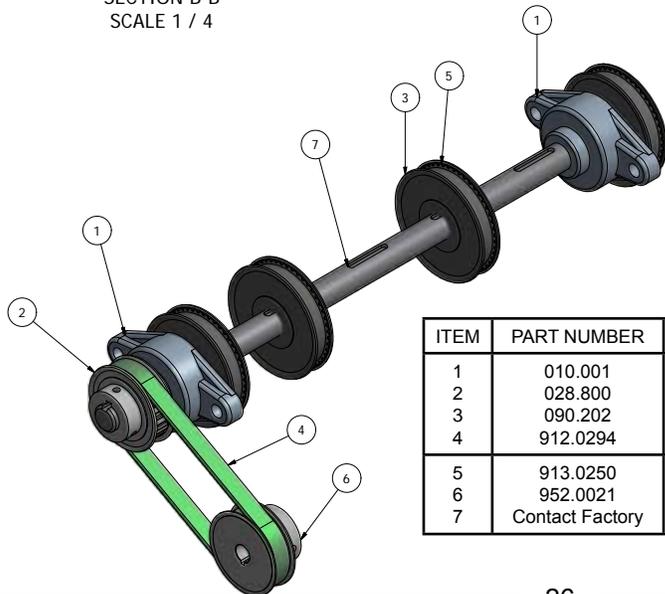
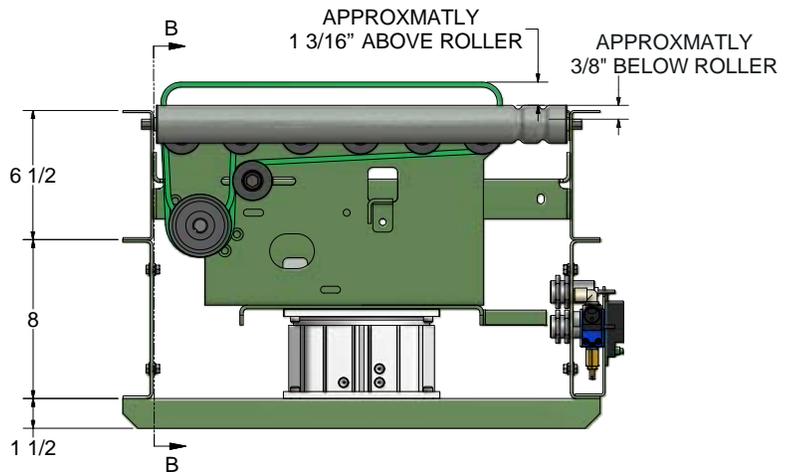


ITEM	PART NUMBER	DESCRIPTION
1	032.211	PROX SWITCH - DC,INDUCTIVE,N.O. 30MM DIA
2	033.090017	UNIDRIVE MOTOR-DC,1.8"LG KEYED SHAFT(E24)
3	033.090025	UNIDRIVE MOTOR CONTROL-E24 1.5/4A RATING
4	Contact Factory	TIMING BELT - 3/8"WIDE X Specify BR
5	923.010225	GUIDE TABLE - 100MM BORE, 40MM STROKE
6	DG-001215	PLUMBING DIAGRAM - XFER LIFT, 24VDC
-	DG-001264	PLUMBING DIAGRAM - XFER LIFT, 120VAC
7	Contact Factory	STRAND CROSS BRACE
8	PT-074144	BRACE MOUNTING CLIP - 1" X 1-1/2"
9	PT-101157	CONTROL CARD MTG ANGLE - 190E24EZ
10	PT-104219-BR	CROSS BRACE - TB XFER, 190E24
11	PT-105341	O-RING GUARD - 3"RC, 190E24
12	PT-106848-BR	BTM GD- TB XFER,7.5"HI CHNL,190E24
13	PT-107264-BR	END GUARD - TB XFER, 190E24
14	PT-156373-BR	Z-STRIKER BRACKET

ITEM	PART NUMBER	DESCRIPTION
15	Contact Factory	SIDE MTG CHNL - TMB TRANSFER
16	Contact Factory	SIDE MTG CHNL - RH, PROX SIDE
17	Contact Factory	LIFT CHNL -2 TO 6 STR TB XFER,17"&UP BRG
18	SA-044897	TAKE-UP KIT - 190E24EZB
19	Contact Factory	STRAND PLATE ASSY -RH,DR SD,190E24
20	Contact Factory	STRAND PLATE ASSY -RH,DR SD,190E24
21	SEE DETAIL	DR SHAFT ASSY - 3/4"DIA

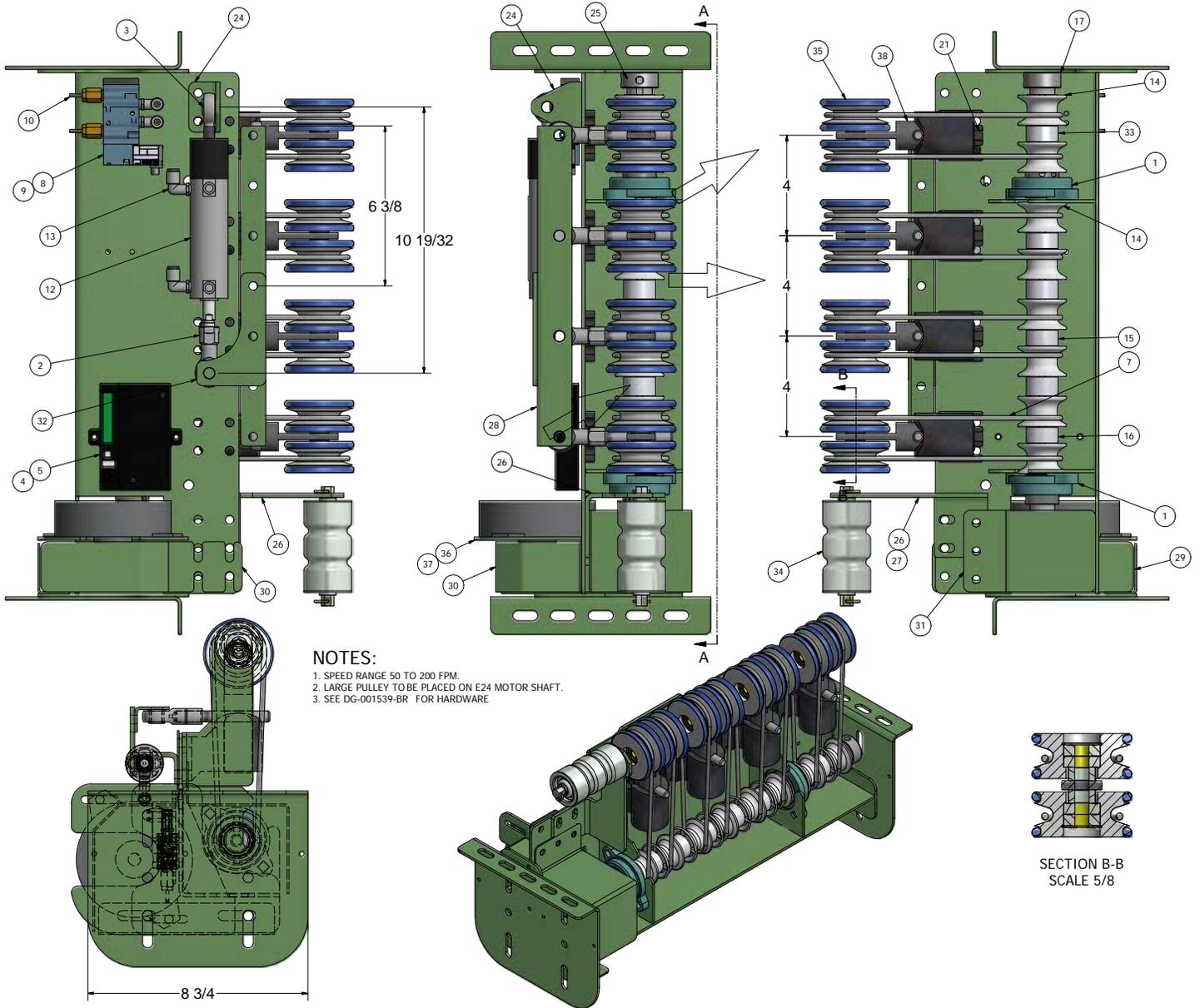


SECTION B-B
SCALE 1 / 4



ITEM	PART NUMBER	DESCRIPTION
1	010.001	BEARING - CAST IRON, 2-BOLT, 3/4"BORE
2	028.800	TIMING BELT SPKT - 18 TOOTH, 3/8" PITCH
3	090.202	SHAFT KEY - 3/16"SQ X 1"LG
4	912.0294	TIMING BELT - 3/8" PITCH, 44 TOOTH
5	913.0250	TIMING BELT SPKT - 48 TOOTH
6	952.0021	TIMING BELT SPKT - 18 TOOTH, 3/8" PITCH
7	Contact Factory	DRIVE SHAFT - TB XFER, 190E24

E24™ Single Diverter

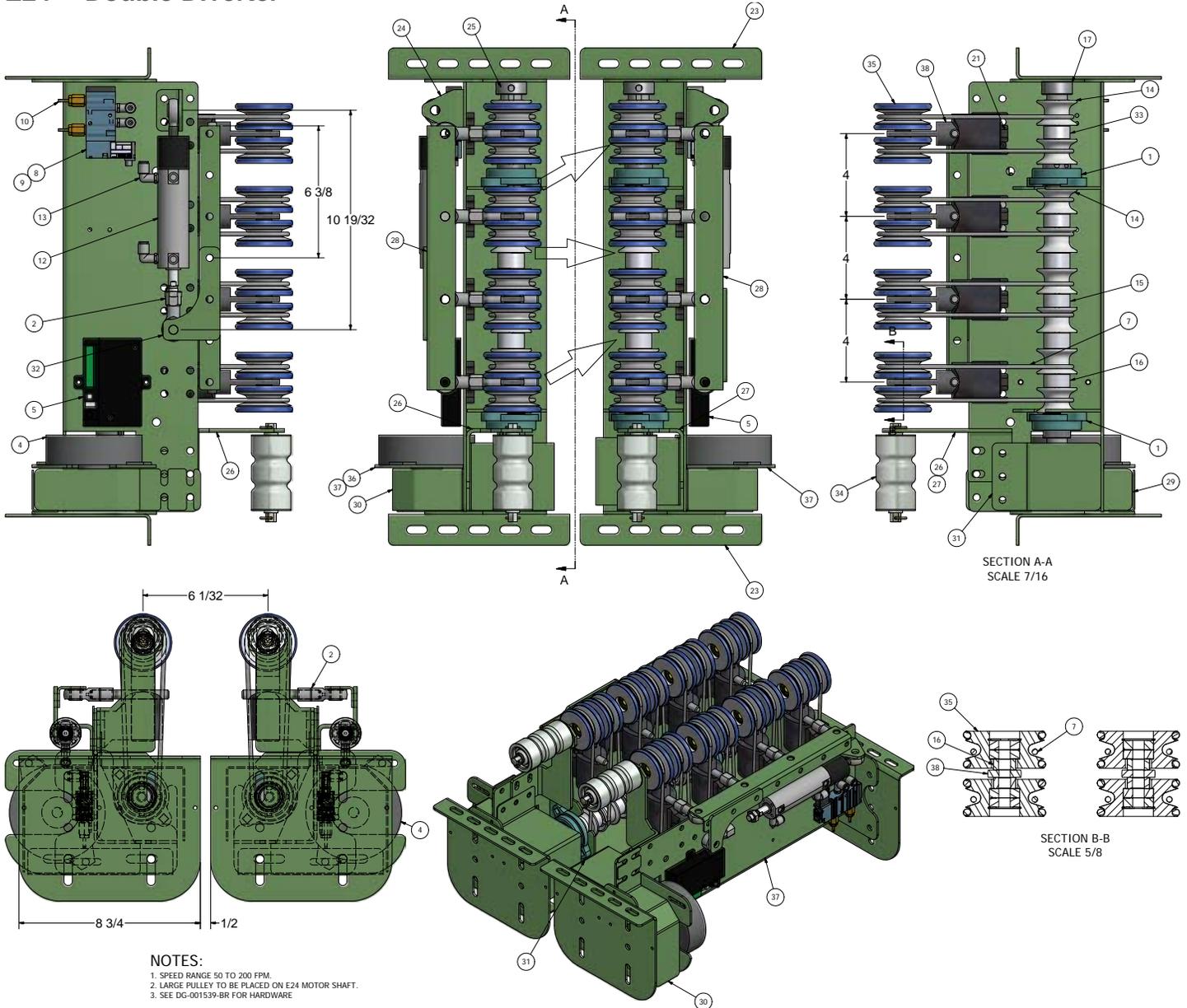


- NOTES:**
1. SPEED RANGE 50 TO 200 FPM.
 2. LARGE PULLEY TO BE PLACED ON E24 MOTOR SHAFT.
 3. SEE DG-001539-BR FOR HARDWARE

ITEM	PART NO.	DESCRIPTION
1	010.0021	BEARING - CAST IRON, 2-BOLT, 1"BORE
2	019.224	FEMALE ROD END - 7/16-20 RH THREADS
3	019.234	MALE ROD END - 7/16-20 RH THREADS
4	033.090017	UNIDRIVE MOTOR - DC, 1-3/8"LG SHAFT (E24)
5	033.09002	UNIDRIVE MOTOR CONTROL
6	090.2002	SHAFT KEY - 1/8"SQ X 3/4"LG (Not Shown)
7	090.255841	O-RING - 6.207"ID X 3/16"THICK
8	094.10795	4-WAY SINGLE SOL AIR VALVE - 24VDC
9	094.10796	PICO CONNECTOR CABLE FOR VALVE #094.1079
10	094.10825	SPEED CONTROL MUFFLER - 1/8"NPT, BRASS
11	094.11481	1/4"OD POLYURETHANE TUBING - GREEN (Not Shown)
12	094.1206	AIR CYLINDER - 2"STROKE, 32MM BORE
13	094.1406	PLASTIC ELBOW - MALE, 360D SWIVEL W/RET
14	094.4101	DRIVE SPOOL - 2"DIA W/INTEGRAL KEY
15	094.42510	SPOOL SPACER - 5/8"LG, 1"SHAFT, NYLON
16	098.150	SPACER - .406"ID X .75"OD X .375"LG
17	098.184	COLLAR - 1"ID X 1-9/16"OD X 5/8"THICK
19	923.0113	STEEL PULLEY -KEYWAY,P22-5M-9 X 1/2"B (Not Shown)
20	913.0252	STEEL PULLEY - P34-5M-9 X 1/2" B (Not Shown)

ITEM	PART NO.	DESCRIPTION
21	923.0134	SUPPORT BLOCK - PIVOT DIVERTER, E24
22	927.0203	350-5M-9H TIMING BELT, BANDO (Not Shown)
23	PT-107698	SIDE SUPPORT ANGLE - E24 PPD (Not Shown)
24	PT-107701	ACTUATOR ATTACHMENT ANGLE - E24 PPD
25	PT-107719-BR	DRIVE SHFT-1"DIA,20-3/8"LG,E24 PPD
26	PT-108868-L	ROLLER SUPT BRACKET - LH
27	PT-108868-R	ROLLER SUPT BRACKET - RH
28	PT-111065-BR	PIVOT ANGLE - E24 PPD
29	PT-111130	GUARD - E24 PPD
30	PT-111132	TIMING BELT GUARD - E24 POWER PIVOT
31	PT-111133	TIMING BELT GUARD - E24 POWER PIVOT
32	PT-119273	ACTUATOR PLATE - 19-39"BR, E24 PPD
33	Contact Factory	SPOOL SPACER - 3/4"LG, 190NSP,NSPEZ
34	SA-049652-*8	1.9"OD GALV DBL GRV RLR- NO SPR,4"BR
35	SA-056593	PIVOT DIVERTER SHEAVE ASSY
36	WA-032956-BR-L	BASE WELD - LH,E24 PPD
37	WA-032956-BR-R	BASE WELD - RH, E24 PPD
38	WA-037046	DIVERT SHAFT WELD - E24 PPD
39	DG-001539-BR	HARDWARE KIT - DOUBLE E24 PPD (Not Shown)
40	DG-001542-BR	HARDWARE KIT - SINGLE E24 PPD (Not Shown)

E24™ Double Diverter

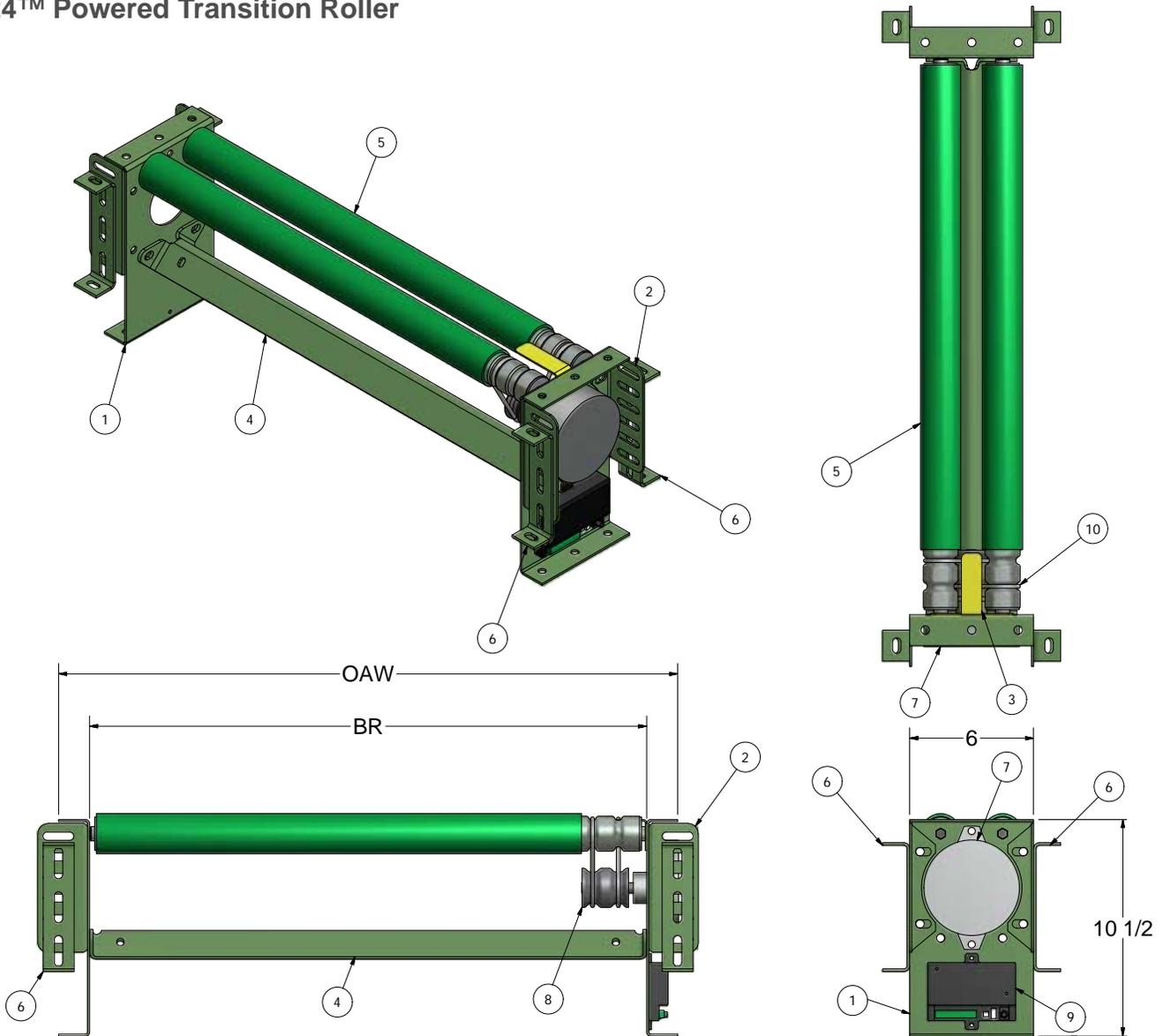


NOTES:
 1. SPEED RANGE 50 TO 200 FPM.
 2. LARGE PULLEY TO BE PLACED ON E24 MOTOR SHAFT.
 3. SEE DG-001539-BR FOR HARDWARE

ITEM	PART NO.	DESCRIPTION
1	010.0021	BEARING - CAST IRON, 2-BOLT, 1"BORE
2	019.224	FEMALE ROD END - 7/16-20 RH THREADS
3	019.234	MALE ROD END - 7/16-20 RH THREADS
4	033.090017	UNIDRIVE MOTOR - DC, 1-3/8"LG SHAFT (E24)
5	033.09002	UNIDRIVE MOTOR CONTROL
6	090.2002	SHAFT KEY - 1/8"SQ X 3/4"LG
7	090.255841	O-RING - 6.207"ID X 3/16"THICK
8	094.10795	4-WAY SINGLE SOL AIR VALVE - 24VDC
9	094.10796	PICO CONNECTOR CABLE FOR VALVE #094.1079
10	094.10825	SPEED CONTROL MUFFLER - 1/8"NPT, BRASS
11	094.11481	1/4"OD POLYURETHANE TUBING - GREEN (Not Shown)
12	094.1206	AIR CYLINDER - 2"STROKE, 32MM BORE
13	094.1406	PLASTIC ELBOW - MALE, 360D SWIVEL W/RET
14	094.4101	DRIVE SPOOL - 2"DIA W/INTEGRAL KEY
15	Contact Factory	SPOOL SPACER - 5/8"LG, 1"SHAFT, NYLON
16	098.150	SPACER - .406"ID X .75"OD X .375"LG
17	098.184	COLLAR - 1"ID X 1-9/16"OD X 5/8"THICK
19	923.0113	STEEL PULLEY -KEYWAY,P22-5M-9 X 1/2"B (Not Shown)
20	913.0252	STEEL PULLEY - P34-5M-9 X 1/2" B (Not Shown)

ITEM	PART NO.	DESCRIPTION
21	923.0134	SUPPORT BLOCK - PIVOT DIVERTER, E24
22	927.0203	350-5M-9H TIMING BELT, BANDO (Not Shown)
23	PT-107698	SIDE SUPPORT ANGLE - E24 PPD
24	PT-107701	ACTUATOR ATTACHMENT ANGLE - E24 PPD
25	PT-107719-BR	DRIVE SHFT-1"DIA,E24 PPD
26	PT-108868-L	ROLLER SUPT BRACKET - LH
27	PT-108868-R	ROLLER SUPT BRACKET - RH
28	PT-111065-BR	PIVOT ANGLE - E24 PPD
29	PT-111130	GUARD - E24 PPD
30	PT-111132	TIMING BELT GUARD - E24 POWER PIVOT
31	PT-111133	TIMING BELT GUARD - E24 POWER PIVOT
32	PT-119273	ACTUATOR PLATE - 19-39"BR, E24 PPD
33	Contact Factory	SPOOL SPACER - 3/4"LG, 190NSP,NSPEZ
34	SA-049652-*8	1.9"OD GALV DBL GRV RLR- NO SPR
35	SA-056593	PIVOT DIVERTER SHEAVE ASSY
36	WA-032956-BR-L	BASE WELD - LH,E24 PPD
37	WA-032956-BR-R	BASE WELD - RH, E24 PPD
38	WA-037046	DIVERT SHAFT WELD - E24 PPD
39	DG-001539-BR	HARDWARE KIT - DOUBLE E24 PPD
40	DG-001542-BR	HARDWARE KIT - SINGLE E24 PPD

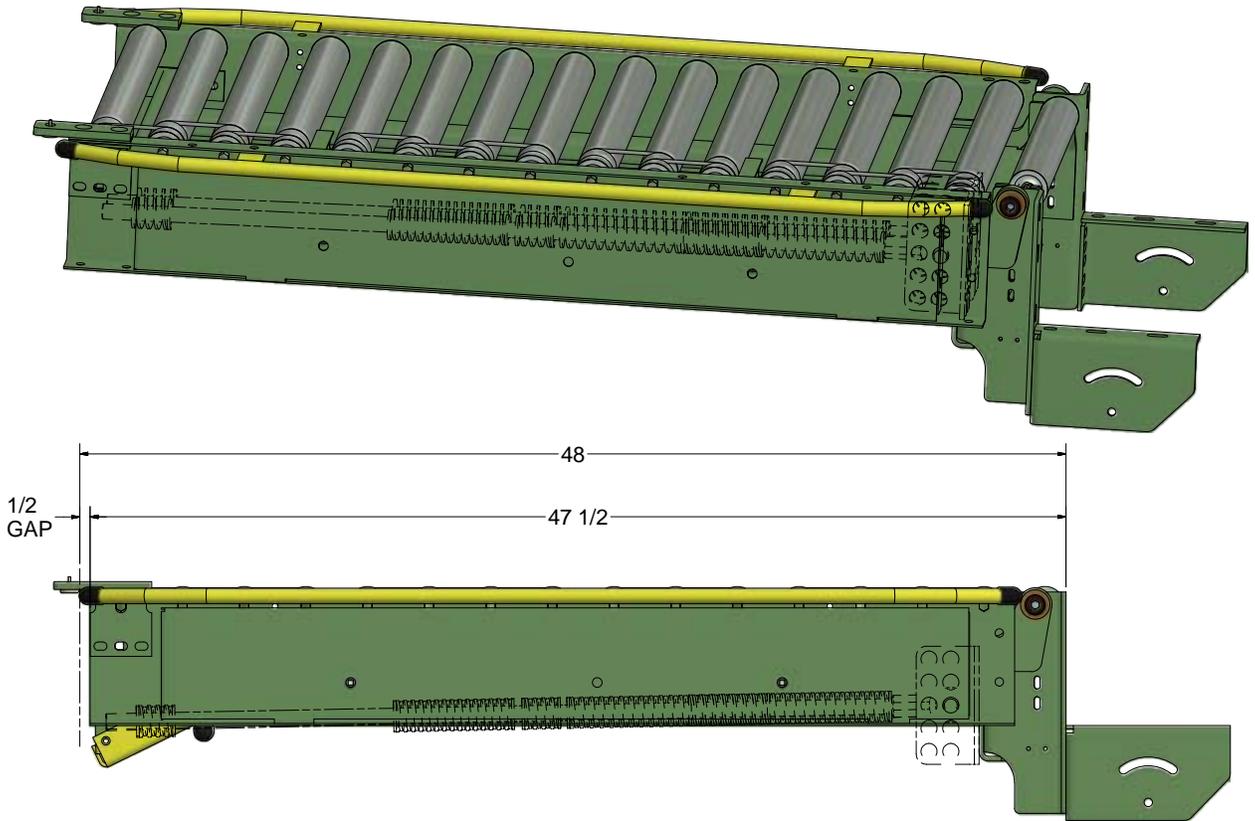
E24™ Powered Transition Roller



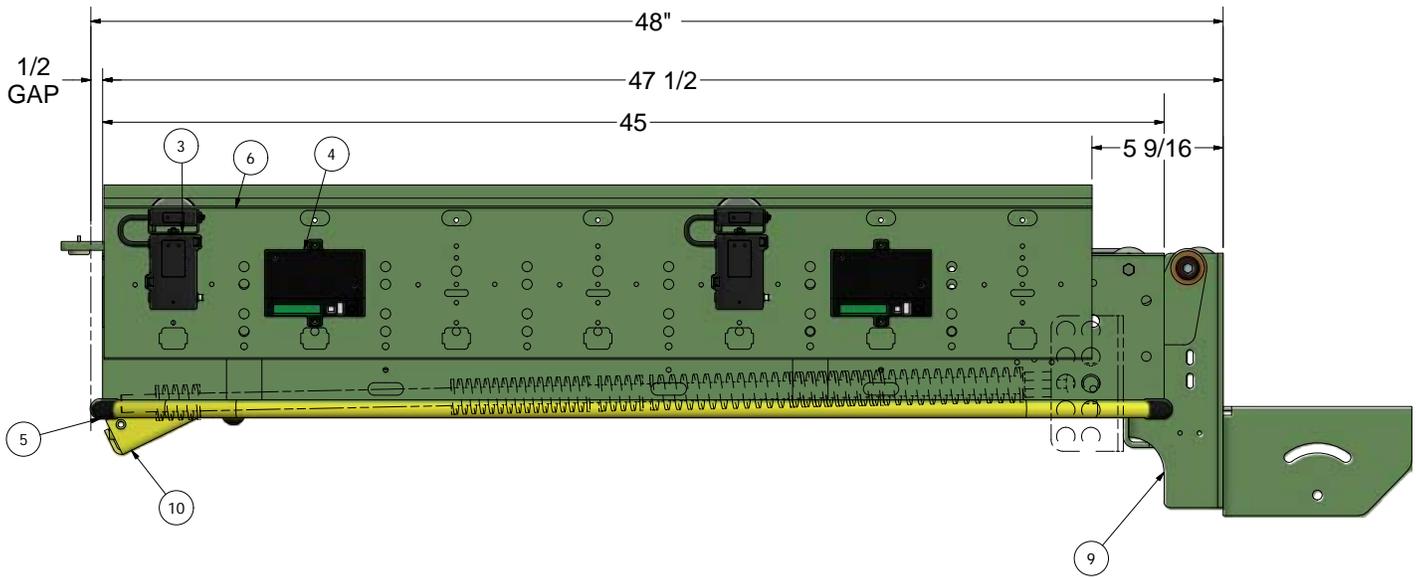
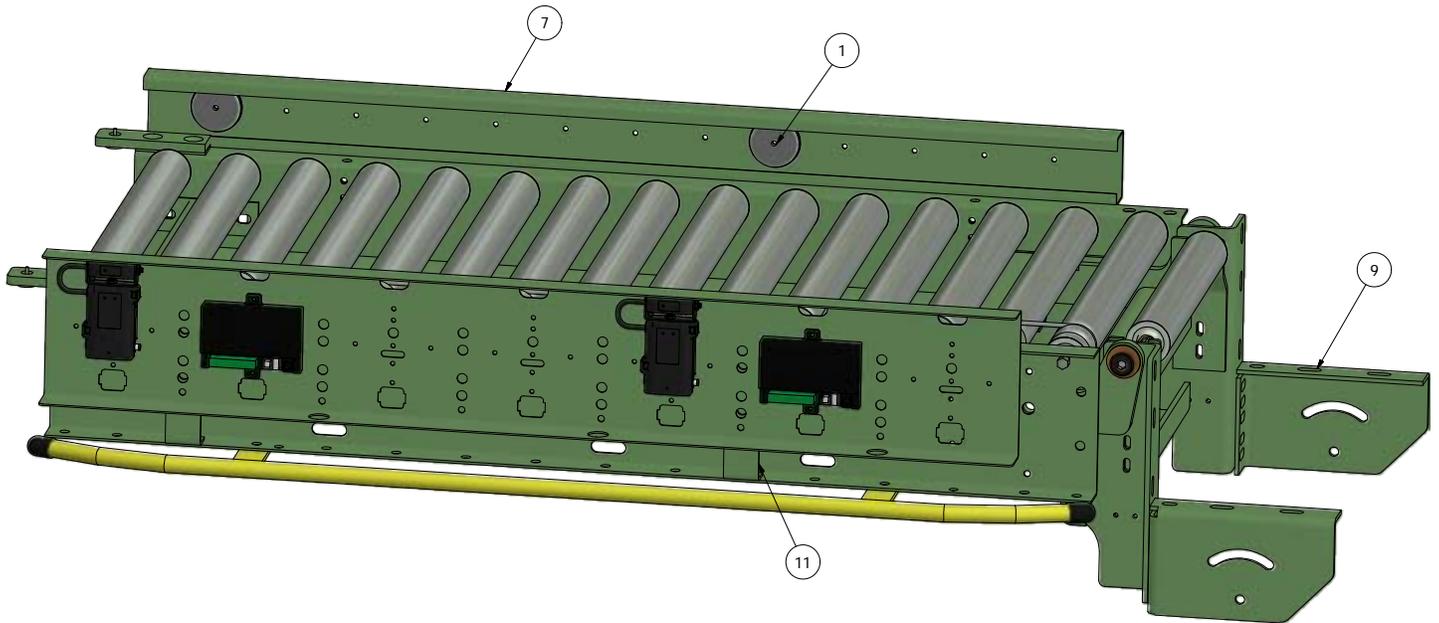
ITEM	PART NUMBER	DESCRIPTION
1	PT-105477	6"LG SIDE CHNL - 10-1/2"DEEP, 190E24
2	PT-105478	BUTT CPLG ANGLE - 1-1/4" X 6-1/4" X 10GA
3	PT-105341	O-RING GUARD - 3"RC, 190E24
4	B-03916-BR	BED SPACER - SPECIFY BR
5	SA-049661	1.7"OD DBL GRV RLR- PLASTISOL - SPECIFY BR
6	Contact Factory	K-BRACKET - 1-1/2" X 1-5/16" X 6-1/4"
7	033.09001	UNIDRIVE MOTOR - DC, 2-1/2"LG SHAFT (E24)
8	094.41501	DRIVE SPOOL - 2-GROOVE, FOR 25-135 FPM
9	033.09002	UNIDRIVE MOTOR CONTROL
10	927.0185	O-RING - 2-29/32"ID X 3/16"THICK
11	040.302	3/8-16 X 3/4"LG HEX HEAD CAP SCREW, ZP
12	049.5285	3/8-16 SMALL FLANGE LOCKNUT, ZP
13	040.201	5/16-18 X 3/4"LG HEX HEAD CAP SCREW, ZP
14	049.528	5/16-18 SMALL FLANGE LOCKNUT, ZP
15	042.10336	#8-32 X 1/2"LG ROUND HEAD MACH SCR, ZP
16	041.801	#8-32 HEX LOCKNUT - NYLON INSERT, ZP
17	043.101	5/16"ID (3/8"BOLT) FLAT STEEL WASHER, ZP

Note: • 21 in and less - transition roller section
 • 24 in and above - E24 section with no powered rollers

E24™ GATE



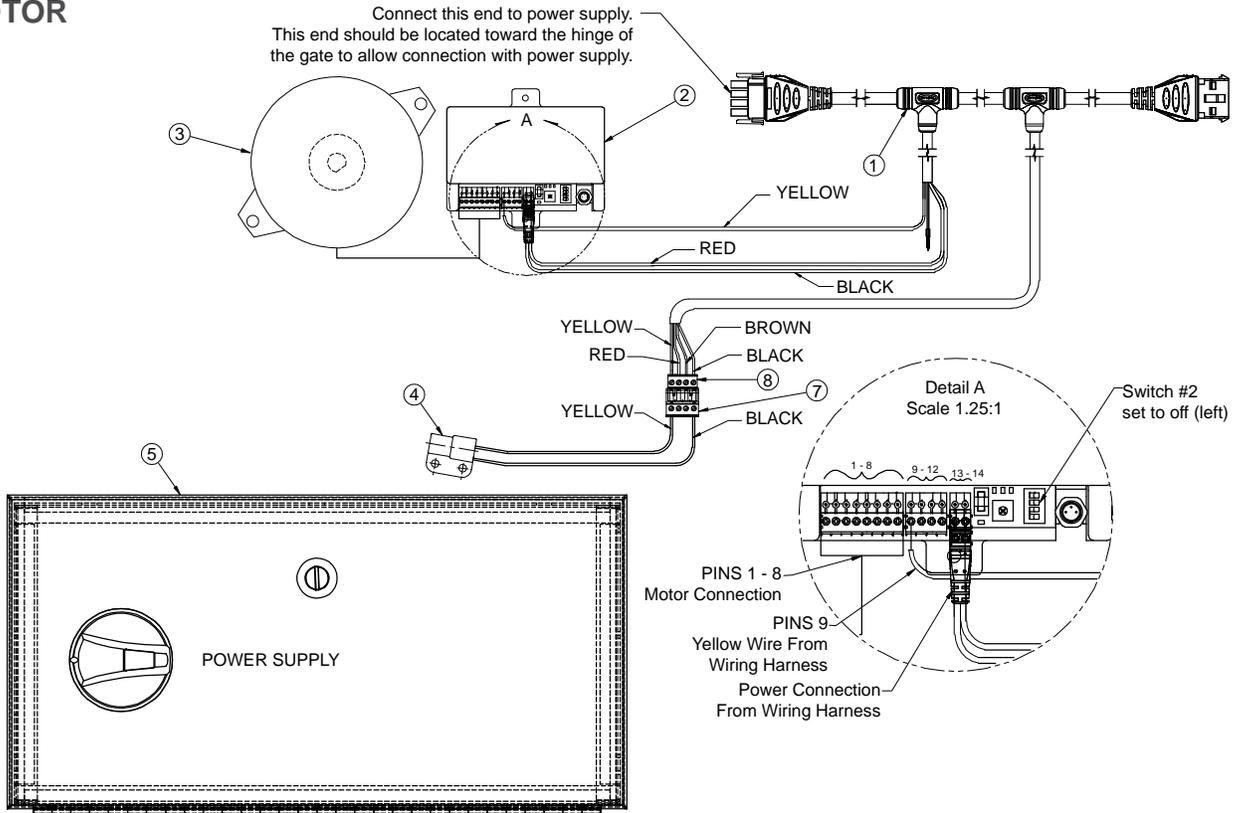
E24EZ GATE



ITEM	PART NUMBER	DESCRIPTION
1	032.218	REFLECTOR - 2.20"DIA, .23"DIA MTG HOLE
2	032.286	TILT SWITCH
3	032.501	UNITIZED ZONE CTRL-POL REFLEX TRANSDUCER
4	033.09002	UNIDRIVE MOTOR CONTROL
5	099.102	KNOB - BLACK PLASTIC, 1"DIA, 3/8-16 THDS
6	B-20507-042	ACCUM CHNL - 41-7/8"LG
7	B-20508-042	REFLECTOR CHNL - 41-7/8"LG
8	B-20601	MTG ANGLE - REFL CHNL,190ABEZ,SPEZ
9	CONTACT FACTORY	GATE HINGE ASSEMBLY
10	PT-062877	GATE LATCH - 5-3/4"LG, DSG
11	PT-066668	K-BRACKET - 1-1/2" X 1" X 6-1/4"

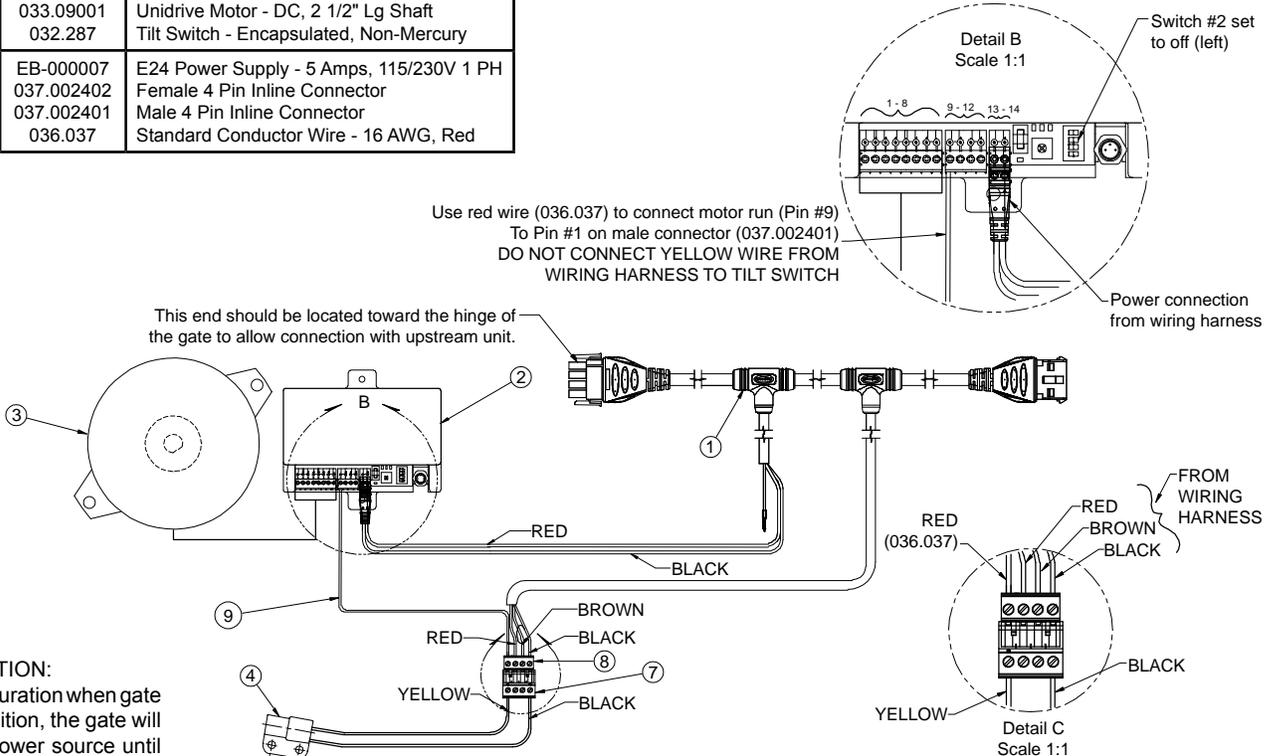
1 E24™ MOTOR

WITH POWER SUPPLY



Ref. No.	Part No.	Description
1	032.70502	Wiring Harness, 5 Ft Long, with 2 Drops
2	033.09002	Unidrive Motor Control
3	033.09001	Unidrive Motor - DC, 2 1/2" Lg Shaft
4	032.287	Tilt Switch - Encapsulated, Non-Mercury
5	EB-000007	E24 Power Supply - 5 Amps, 115/230V 1 PH
6	037.002402	Female 4 Pin Inline Connector
7	037.002401	Male 4 Pin Inline Connector
8	036.037	Standard Conductor Wire - 16 AWG, Red

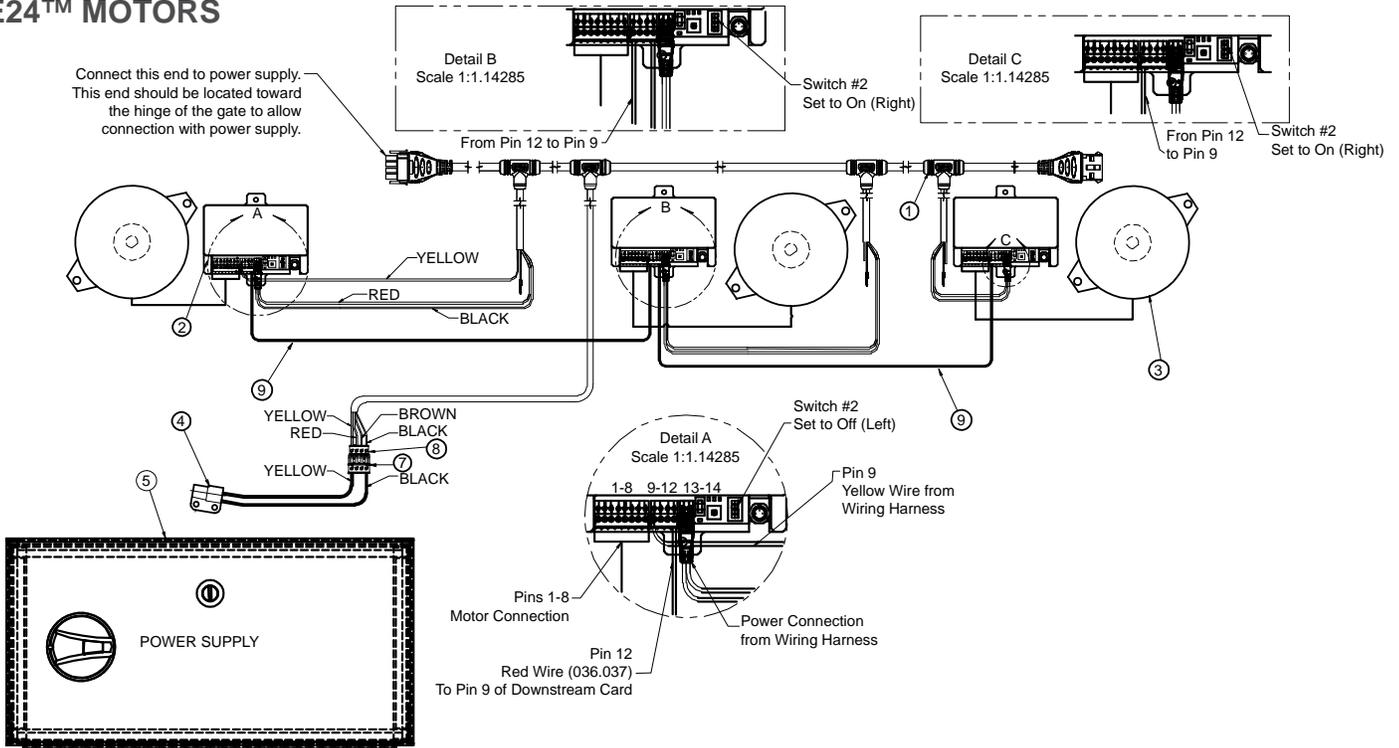
WITHOUT POWER SUPPLY



GATE OPERATION:
With this configuration when gate is in the up position, the gate will stop, but the power source until will continue to operate.

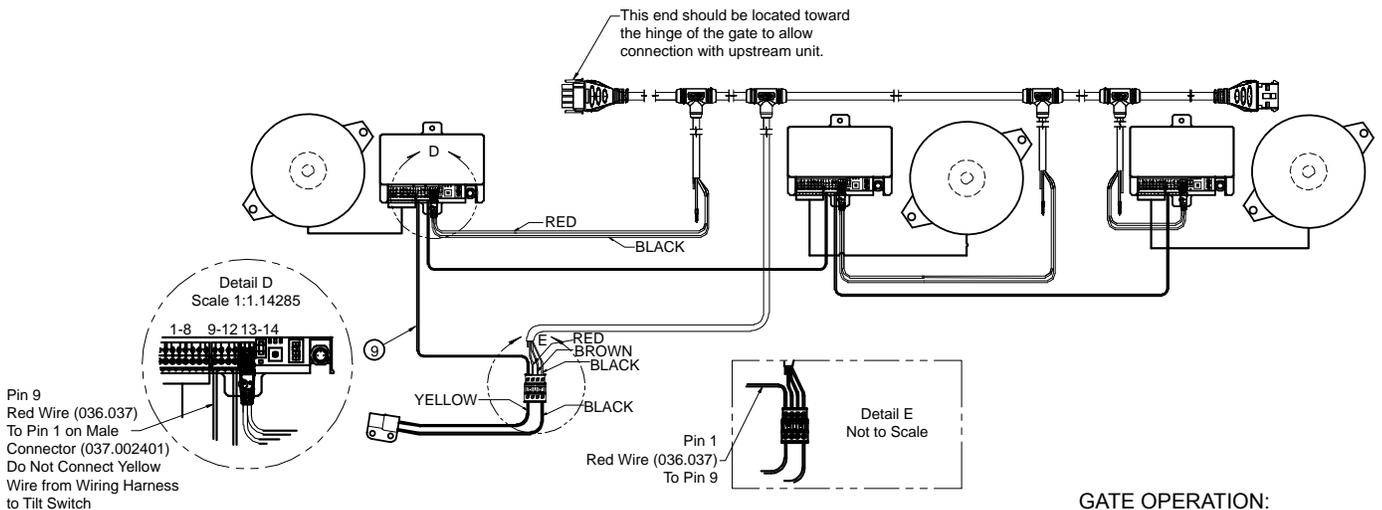
3 E24™ MOTORS

WITH POWER SUPPLY



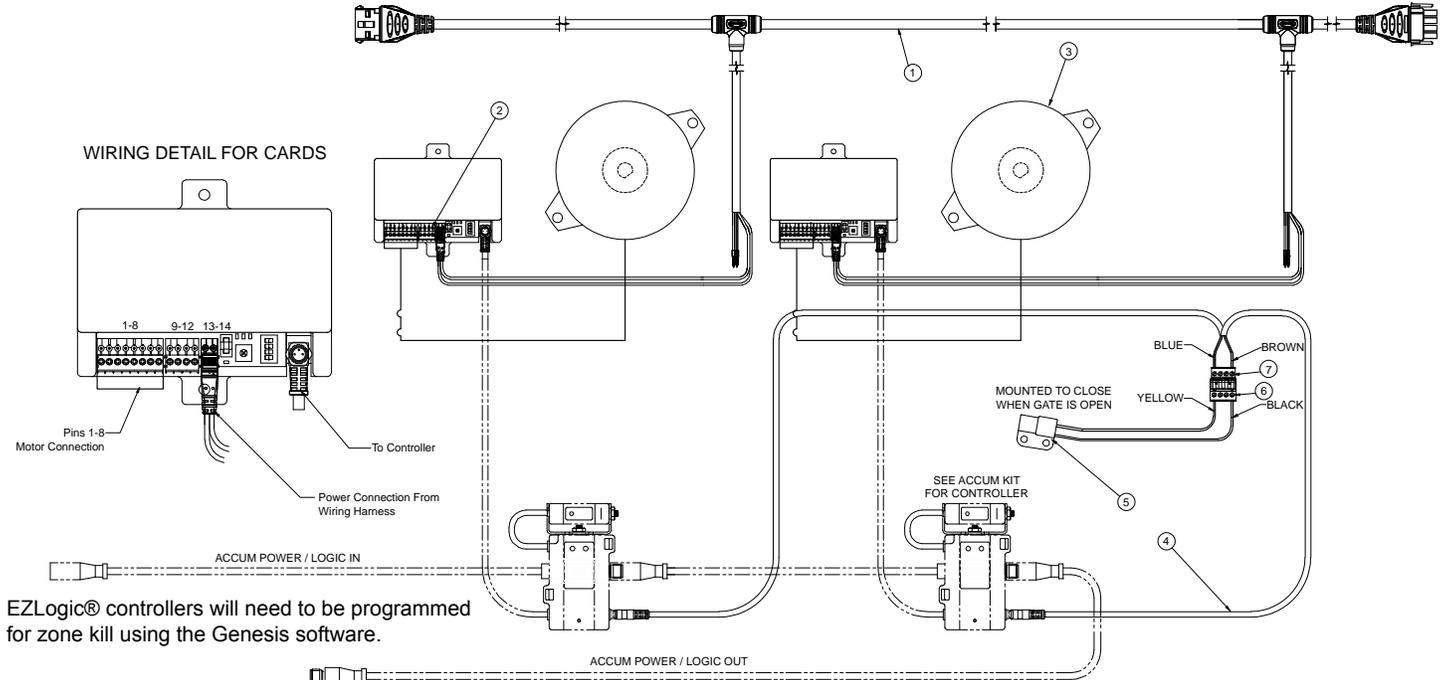
Ref. No.	Part No.	Description
1	032.70404	Wiring Harness, 4 Ft Long, with 4 Drops
2	033.09002	Unidrive Motor Control
3	033.09001	Unidrive Motor - DC, 2 1/2" Lg Shaft
4	032.287	Tilt Switch - Encapsulated, Non-Mercury
5	EB-000007	E24 Power Supply - 5 Amps, 115/230V 1 PH
6	037.002402	Female 4 Pin Inline Connector
7	037.002401	Male 4 Pin Inline Connector
8	036.037	Standard Conductor Wire - 16 AWG, Red

WITHOUT POWER SUPPLY



GATE OPERATION:
 With this configuration when gate is in the up position, the gate will stop, but the power source until will continue to operate.

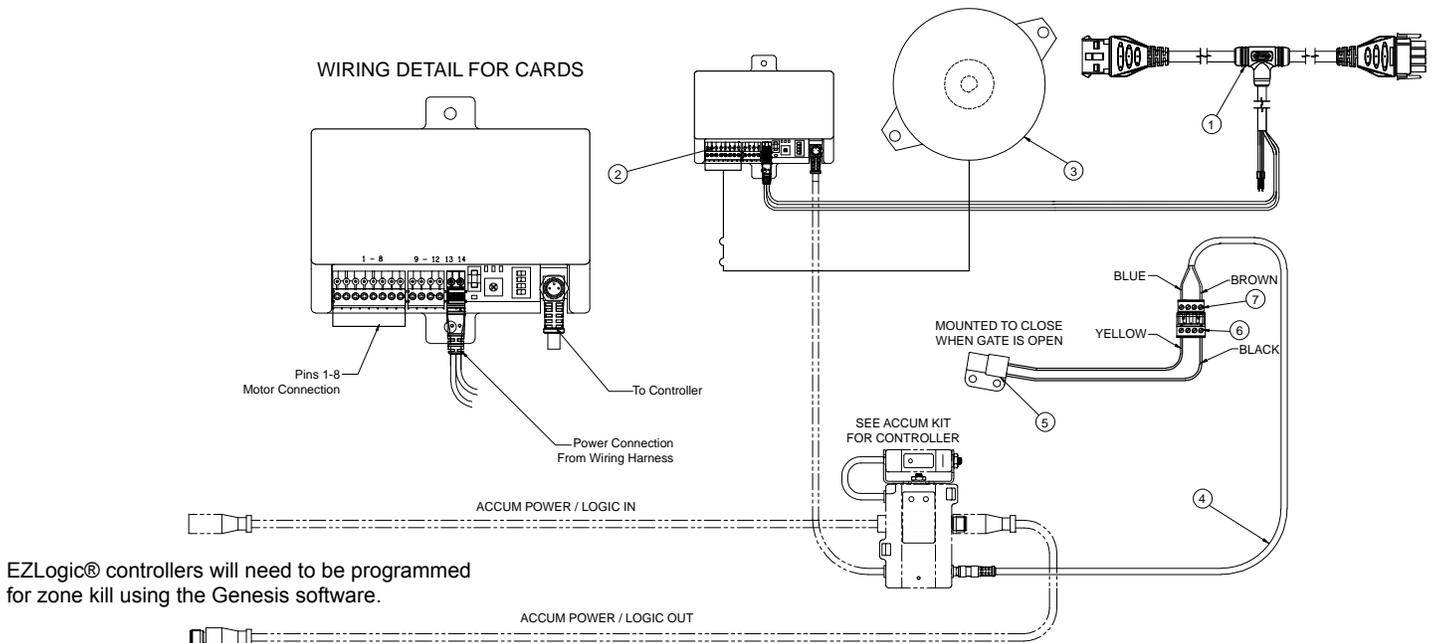
2 EZLOGIC® ZONES & 1 E24™ MOTOR PER ZONE



EZLogic® controllers will need to be programmed for zone kill using the Genesis software.

Ref. No.	Part No.	Description
1	032.70502	Wiring Harness, 5 ft Lg, with 2 Drops
2	033.09002	Unidrive Motor Control
3	033.09001	Unidrive Motor - DC, 2 1/2" LG Shaft
4	032.563	Auxiliary Input Cable - 3' Lg
5	032.287	Tilt Switch - Encapsulated, Non-Mercury
6	037.002402	Female 4 Pin Inline Connector
7	037.002401	Male 4 Pin Inline Connector

1 EZLOGIC® ZONE & 1 E24™ MOTOR PER ZONE

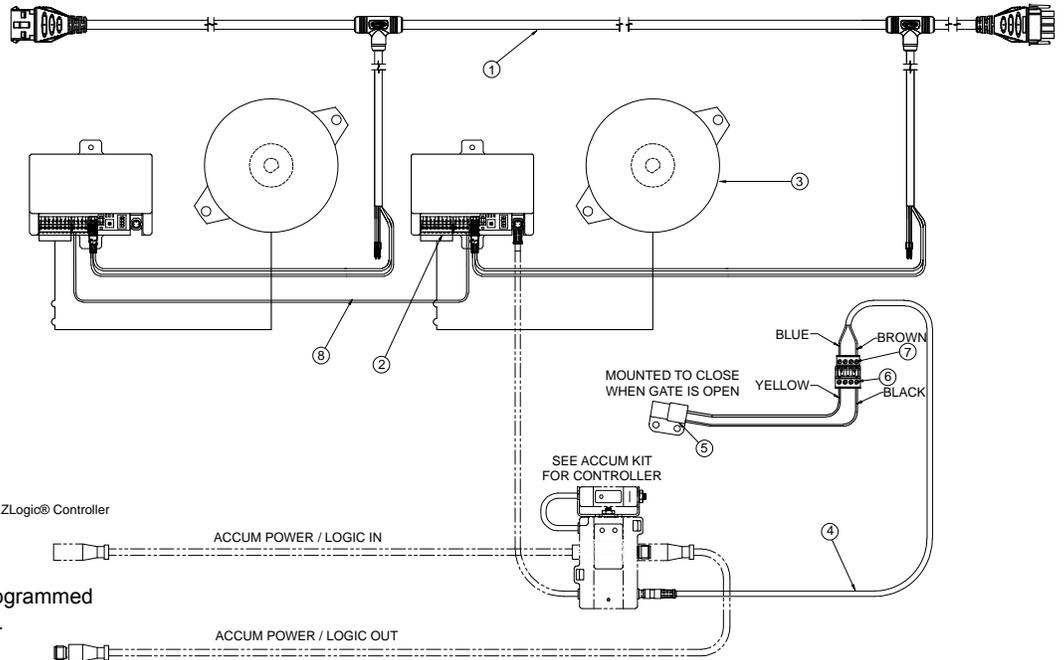
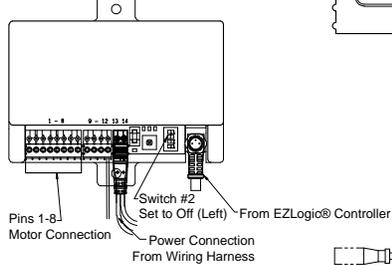
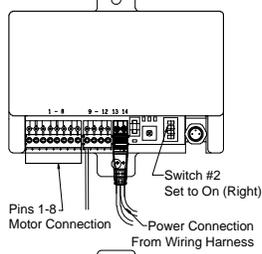


EZLogic® controllers will need to be programmed for zone kill using the Genesis software.

Ref. No.	Part No.	Description
1	032.70401	Wiring Harness, 4 ft Lg, with 1 Drop
2	033.09002	Unidrive Motor Control
3	033.09001	Unidrive Motor - DC, 2 1/2" LG Shaft
4	032.563	Auxiliary Input Cable - 3' Lg
5	032.287	Tilt Switch - Encapsulated, Non-Mercury
6	037.002402	Female 4 Pin Inline Connector
7	037.002401	Male 4 Pin Inline Connector

1 EZLOGIC® ZONE & 2 E24™ MOTOR PER ZONE

WIRING DETAIL FOR CARDS

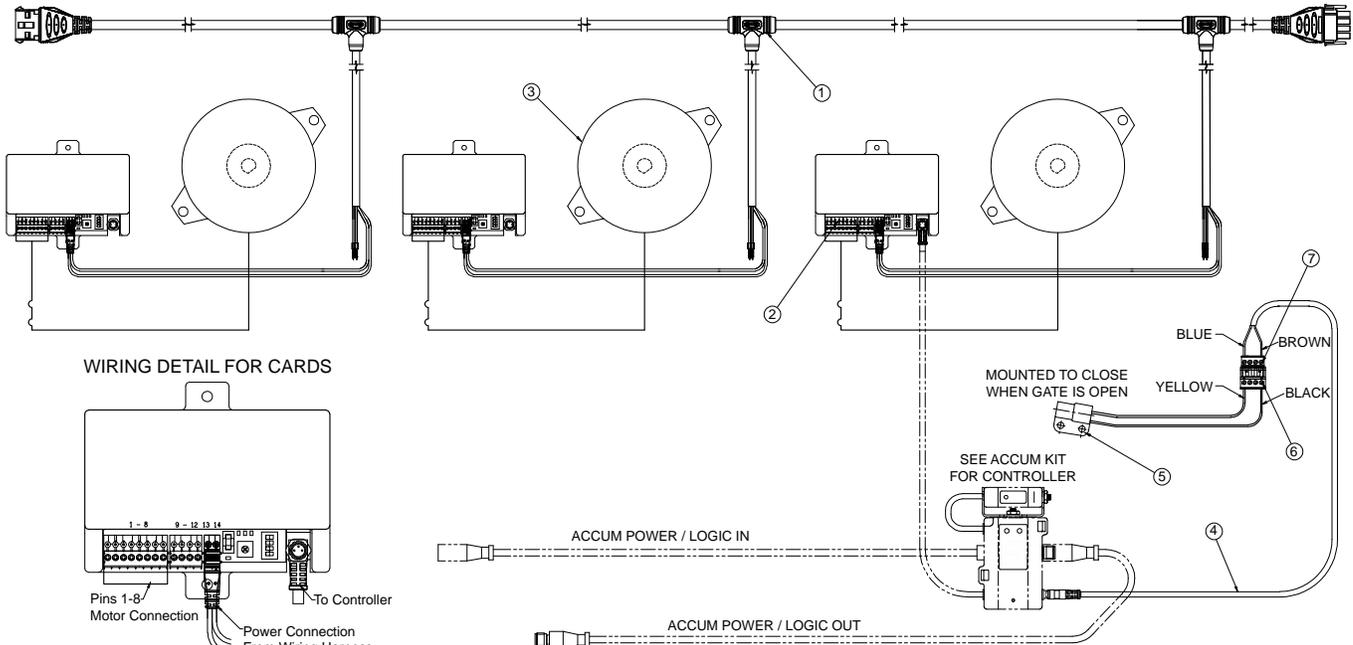
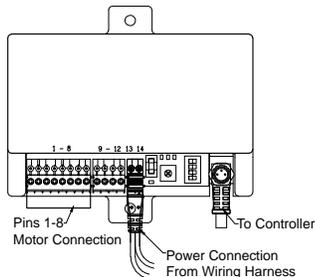


EZLogic® controllers will need to be programmed for zone kill using the Genesis software.

Ref. No.	Part No.	Description
1	032.70502	Wiring Harness, 5 ft Lg, with 2 Drop
2	033.09002	Unidrive Motor Control
3	033.09001	Unidrive Motor - DC, 2 1/2" LG Shaft
4	032.563	Auxiliary Input Cable - 3' Lg
5	032.287	Tilt Switch - Encapsulated, Non-Mercury
6	037.002402	Female 4 Pin Inline Connector
7	037.002401	Male 4 Pin Inline Connector

1 EZLOGIC® ZONE & 3 E24™ MOTOR PER ZONE

WIRING DETAIL FOR CARDS



EZLogic® controllers will need to be programmed for zone kill using the Genesis software.

Ref. No.	Part No.	Description
1	032.71003	Wiring Harness, 10 ft Lg, with 3 Drops
2	033.09002	Unidrive Motor Control
3	033.09001	Unidrive Motor - DC, 2 1/2" LG Shaft
4	032.563	Auxiliary Input Cable - 3' Lg
5	032.287	Tilt Switch - Encapsulated, Non-Mercury
6	037.002402	Female 4 Pin Inline Connector
7	037.002401	Male 4 Pin Inline Connector



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EFFECTIVE September 2015