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Project 21156  
Fireplace Great Wolf Resort – Webster TX  
BRC Imagination Arts

Operating Manual

<b>Customer:</b>	BRC Imagination Arts – Great Wolf Resort - Perryville
<b>Entech Project Number:</b>	21-21156 BRC GWR Fireplace
<b>Date:</b>	7/29/24
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### Revision History

Date	Version	Changed By	Description of Changes
7/29/24	Rev A	E Roehl	Initial

### Related Documents

File Name	Title
Dorner You Tube video link to change belt	<a href="https://www.youtube.com/watch?v=I1FE50zn0rA">https://www.youtube.com/watch?v=I1FE50zn0rA</a>



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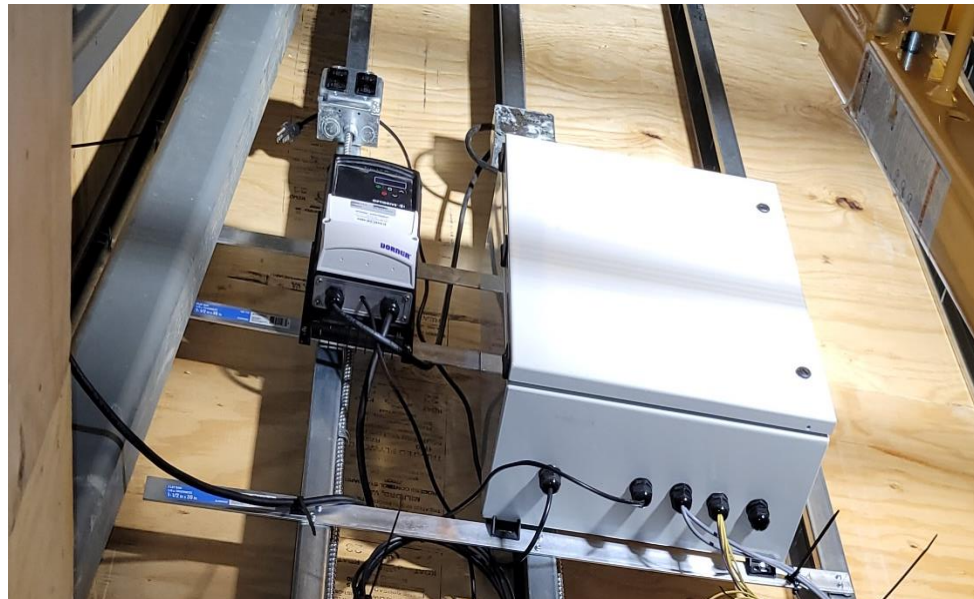
## Conveyor Belt Procedures

### Tools required.

- SAE socket and wrench set (5/16" bolts)
- Metric Long reach and short Allen wrenches – 6MM and 4.5.mm.
  - Note the Dorner conveyor is assembled using metric hardware and additional Allen wrench sizes may be needed should other areas of the conveyor need maintenance or access.
- Ratchet strap or small come along
- Access platforms / scaffolding to change the belt
- Ladder to access control box and VFD if scaffolding is not installed.

### Orientation

To change the belt, you will need full access to the back side of the conveyor. Note that scaffolding is recommended to provide working platforms at the middle and bottom of the conveyor. Standing in the fireplace looking at the conveyor, you will see the drive unit in the middle with the motor on the right-hand side. The right-hand side is also the hinged side. Adjacent to the motor on the side wall is the Dorner Variable Frequency Drive (VFD – small black controller) and the control box, which houses the PLC that drives the VFD.



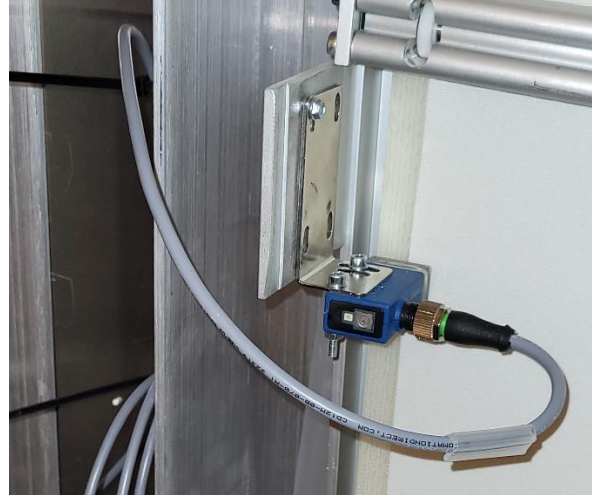
In the lower corners of the conveyor are the two position sensors. The stage right is the Position 1 Sensor (P1 – portrait) and the stage left is the Position 2 (P2 – projection screen). These sensors are optical contrast sensors and read the change in color from the white edge to the black marks placed on



the belt as the signals to the PLC to change speeds or stop. Marks are placed on the belt about 4.5" apart. They measure about 3/4" wide and 1" long.



P1 sensor Portrait



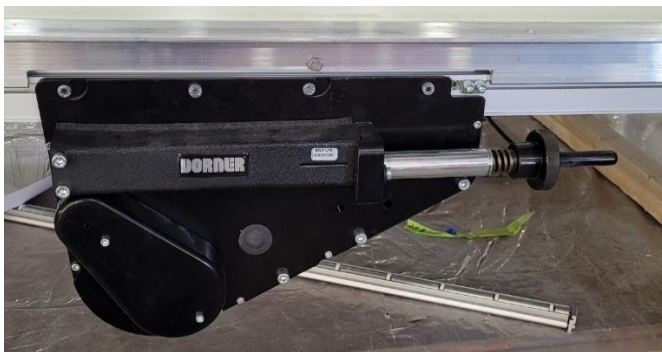
P2 Sensor – Projection screen

Just above each sensor is a set of rollers to help the belt stay as flat as possible while passing the sensors.

### Belt Removal

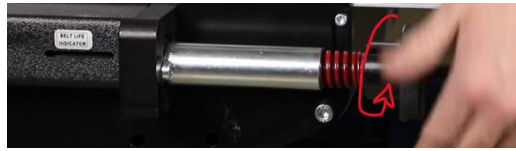
1. Disconnect Electricity to the control box either by unplugging the box from the outlet or throwing the breaker in the box.
2. Unplug the sensor cables from both sensors in the bottom corners.
3. Using the 4.5mm Allen wrench, remove the two roller bars adjacent to the sensors. Note that this only requires loosening the 4 screws on both sides and complete removal of the screws is not needed. Set the rollers aside.
4. Release tension from the belt by turning the knobs on the threaded rod until the end of the threaded rod is flush with the top of the knob.

Note that tension should be released as evenly as possible from both sides.

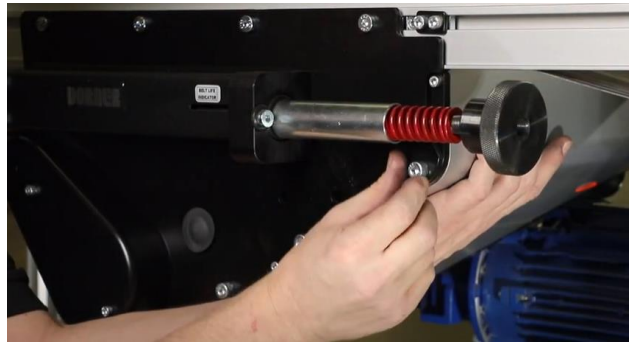




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5. Remove screw shown in below picture from each side of center drive side plate, supporting the idler roller assembly (note that as installed this is the upper side of the drive assembly)



6. Swing idler roller assembly open



7. While supporting the assembly, remove the remaining two 6mm screws from BOTH sides of the idler roller assembly and set assembly aside. (Note this assembly is heavy and the screws should be removed simultaneously to prevent binding and damage.)



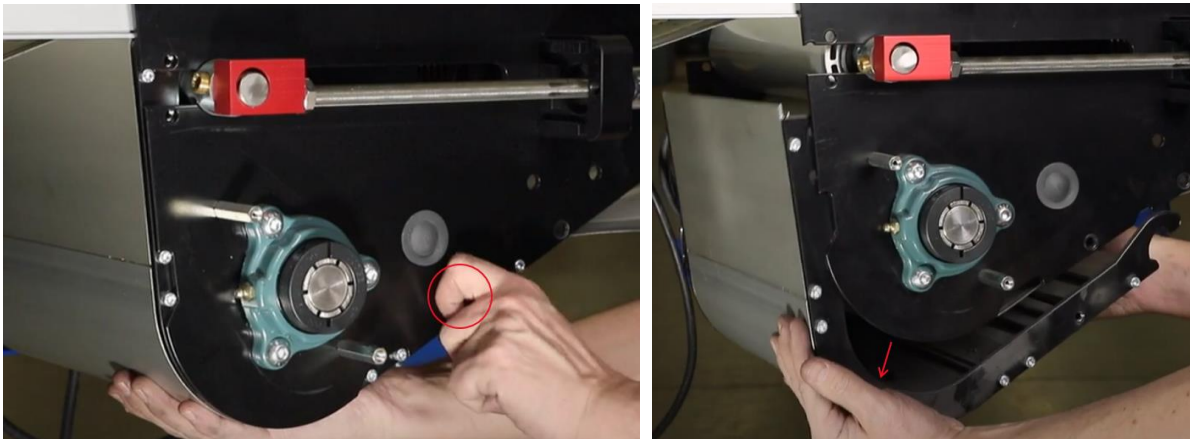


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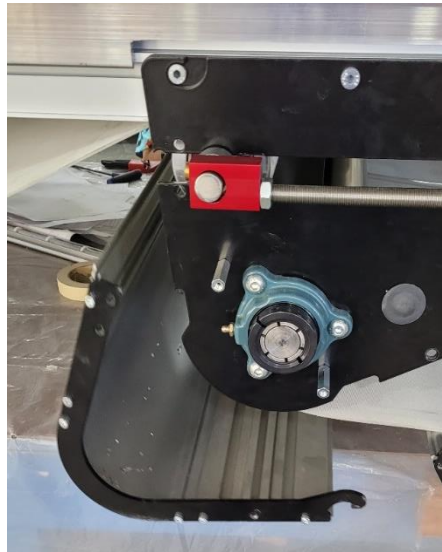
8. Remove the remaining 6mm screws from the bearing guard cover and set aside.



9. Remove the upper pair (as installed) 6mm screws on both sides of the roller guard and allow it to swing open.



10. While supporting the guard, remove the remaining two 6mm screws from the guard assembly and set aside. (Note this assembly is heavy and the screws should be removed simultaneously to prevent binding and damage.)



11. Be sure to support the tensioning roller during next step as it is heavy and can be damaged. On both sides of the center drive, gently pull the red block outwards until the tension roller shaft pops free. Carefully lower the tensioning roller and set aside. Note that on the drive side there is a black spacer bushing. Do not lose this as it slides off the shaft easily.



12. The belt should now be hanging loosely.





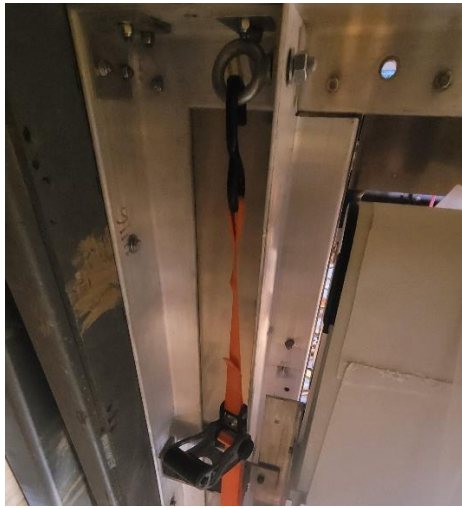
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13. On the upper left hand corner (standing inside the fireplace looking at the conveyor) you will see a frame which is off the face of the conveyor. Connect one end of the ratchet strap to the frame and the other end to the notch the black plate of the drive assembly.



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14. Tension the strap so that it is not loose. Do not over tension at this time.
15. There are five angle brackets on the left hand side. Loosen the bolts using a socket and wrench. Gently tension the ratchet strap until the bolts become loose in the hole; you can remove the bolts. Note that it is possible that adjustments in ratchet strap tension may be needed to allow the removal of all the bolts.





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16. Once the bolts are removed, the conveyor will swing open a short distance once the tension is removed from the ratchet strap. It is recommended that the ratchet strap be left in place but loose until the conveyor starts to swing inward.

**WARNING.** The conveyor should not be left in an open and unsupported condition for any length of time when changing belts. If it becomes necessary, pause the belt changing operation, the conveyor should be swung closed, ratchet strap replaced and tensioned, and the bolts slid into the holes. Re-adding the nuts are not necessary.

17. Removing the belt will require multiple people. It will likely require at least two people on the upper platform and two below with support people on the floor to handle the belt going into and out of the fireplace. Carefully lift the bolt off the top roller and slide sideways. Make sure the sensor and sensor brackets on the bottom are not hanging up on the belt. Slowly work the belt to the left and bending it as needed to make the bend around the end of the conveyor and into the chimney. Once clear of the top roller, the belt can be carefully lowered and pulled out the fireplace opening below.

## Installation

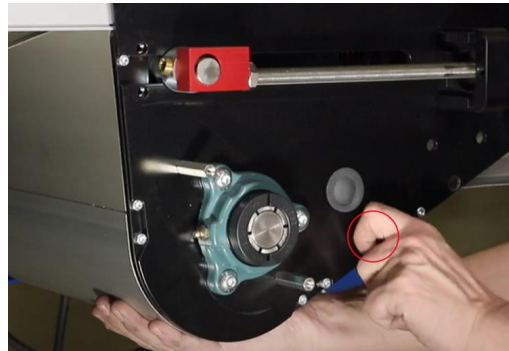
1. Ensure the artwork is in the proper orientation before installing.
2. Carefully slide the belt into the chimney and up to the two people on the top platform.
3. Slide the belt over the top roller while guiding it over the bottom roller and making sure it clears the sensors on the bottom corners.
4. Once the belt is in position, ensure that the V on the back of the belt is engaged with the V groove in the top roller.
5. Double check the artwork is installed in the proper orientation and the excess belt length is hanging down on the inside of the chimney.
6. Carefully tuck the belt under the sensors and close the conveyor.
7. Reinstall the ratchet strap and lightly tension the strap.
8. Make sure the conveyor is pushed all the way closed and hard up against the Aluminum face plate
9. Tension the ratchet strap until the 5/16" bolts can be inserted into the AL angles to bolt the conveyor closed. Ensure all three are installed.
10. Install the nuts and tighten until snug.
11. Remove the ratchet strap.
12. Install the tension roller. Ensure that the black bushing is on the drive side and installed and the brass collar is on the opposite side. Ensure that the black bushing is installed between the roller and the black frame and slide the roller up the slot in the plates.



13. While supporting the roller, gently pull the red connectors outward and slide the roller upward until the shaft pops into place. Note that this will remove a significant amount of slack in the belt.



14. Make sure the belt is properly installed behind the sensors and then reinstall the guide rollers. (Install one above each sensor. Note that there is only one location that will work for the lower one and the upper one should be installed as low as possible to ensure the sensors do not pick up any belt movement in the fore / aft direction.)
15. Install the roller guard. Note that the frame has notches for the screws used to assemble the guard to help position the guard. Install the lower two 6mm screws, pivot closed and then install the upper two 6mm screws



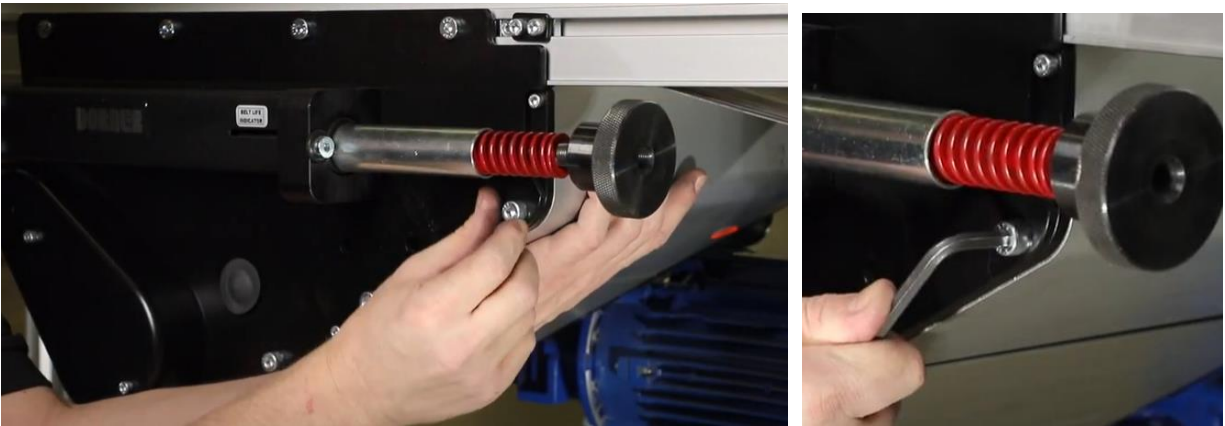
16. Replace the idler roller assembly and screw in the lower set of 6mm screws leaving them a bit loose to allow the assembly to pivot



17. Swing the idler roller assembly up and place and install the remaining pair of 6mm screws.



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18. Tighten all screws holding idler roller assembly and tensioning guard.

19. Replace the bearing cover



20. The belt will be a bit loose to the point you should be able to adjust its position laterally to ensure the V on the back of the belt is engaged with the V groove on the top and bottom rollers. This also ensure the belts is not hung up on the sensors

21. Start tensioning the belt by turning the tensioning knob against the spring on both sides. Note that you should tension the belt on both sides in an even manner. Use the amount of exposed spring as a gauge and ensure both sides are within a  $\frac{1}{4}$ " of each other during this process. Continue tensioning the belts until about 1" of spring is left exposed.



22. Plug the sensors back into their sensor cables. Ensure P1 is plugged into the stage right and P2 into the stage left Sensor
23. Restore power to the unit: the conveyor and control box.
24. Ensure the yellow lights on the backs of the sensors are lit. Note that if a sensor is on a black marker, the signal light will not be showing.
25. Ensure that the sensor is about  $\frac{1}{2}$ " –  $\frac{3}{4}$ " from the belt surface and the sensing light (white light projected at the belt) is aimed about  $\frac{1}{2}$ " in from the edge of the belt. To ensure the sensor is working you can slide a black piece of material into the sensing light and the yellow indicator light should turn off.
26. Send home command to the conveyor will send the conveyor looking for the home, or P1, position. Should the sensors not read, minor adjustments to the distance and aiming at the belt may be needed. Do the same for both sensors as the logic of the home command is to find P2, then stop on P1. This can be done while running the conveyor.
27. Once home position (P1) is located, then send to P2. Note that in order to stop at any position, the sensors need to catch both marks on the belt. If one of the 2 adjacent marks is not sensed, then belt will change to slow speed and then continue until it finds another mark for the position it is looking for. The result will be that the belt does another revolution in slow speed until it finds the next mark, which will most likely be same one used to slow it down and thus causing the belt to be out of position. Should this occur, minor adjustment to the sensors may be needed until both are being flagged.
28. Once all the sensors are set, you can leave the belt tension alone or tighten it more. Adjust in  $\frac{1}{8}$ " increments going to a maximum of  $\frac{1}{2}$ " of spring exposed.

## Adjust Belt default speed on VFD drive.

1. Press and hold the square button for a few seconds until the display flashes.



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2. It will show "P##" where the ## is anything from 01 and up.
3. Use up and down arrows to change to P21. This is the high-speed control.



4. Press the Square button again to enter. It will display number ##.# this is the frequency with the last number flashing. 60.0 is the max.



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5. To slow it down. Use the down arrows to change it to about 20.0. 20 seems to be the low end that the drive will operate. Frequency below that input will be ignored, and it will operate at 20 hertz. Note that any number between 20 and 60 may be used to adjust the high-end speed.
6. Press the square to exit and it will return to the P21 screen.



7. Wait about 15 seconds and the drive will revert to normal operation and display "Stop"





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8. The max speed is now set as slow as possible when running the program.
9. To reset the high-end speed. Repeat the above steps changing the frequency to 60.0.
10. While there should be no reason to do so, the function P20 is the low-end speed control. It should be set at any number 20.0 and lower. Increasing the low-end speed may affect the ability of the conveyor to stop at the appropriate place once the second flag is read by the sensors.



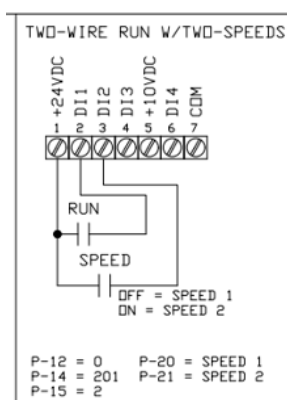
## Control / Driver Specifications

### PLC Ladder Logic Code

- Software IDE: Click Programming Software
- Manufacturer: Automation Direct
- Version: 3.31
- Code file name: LodgeFireplaceV4.ckp

### Motor Driver

- Inertek OptiDrive E3
- Terminal Strip specification:





VFD Default Parameters:

Invertek OptiDrive E3 Parameters		
Parameter	Description	Setting
P1	Maximum Speed	60 Hz
P2	Minimum Speed	0
P3	Acceleration	.5 sec
P4	Deceleration	.5 sec
P5	Stop Mode	0
P6	Energy Optimizer	0
P7	Motor Rated	230
P8	Current	2.9
P9	Rated Frequency	60 Hz
P10	Rated Sped	0
P11	Ignore	3
P12	Control Source	0
P13	Application Mode	0
P14	Modify Upper Parameters Unlock Code	201
P15	Macro	2
P17		8
P18		1
P19		100
P20	Speed 1	1
P21	Speed 2	60