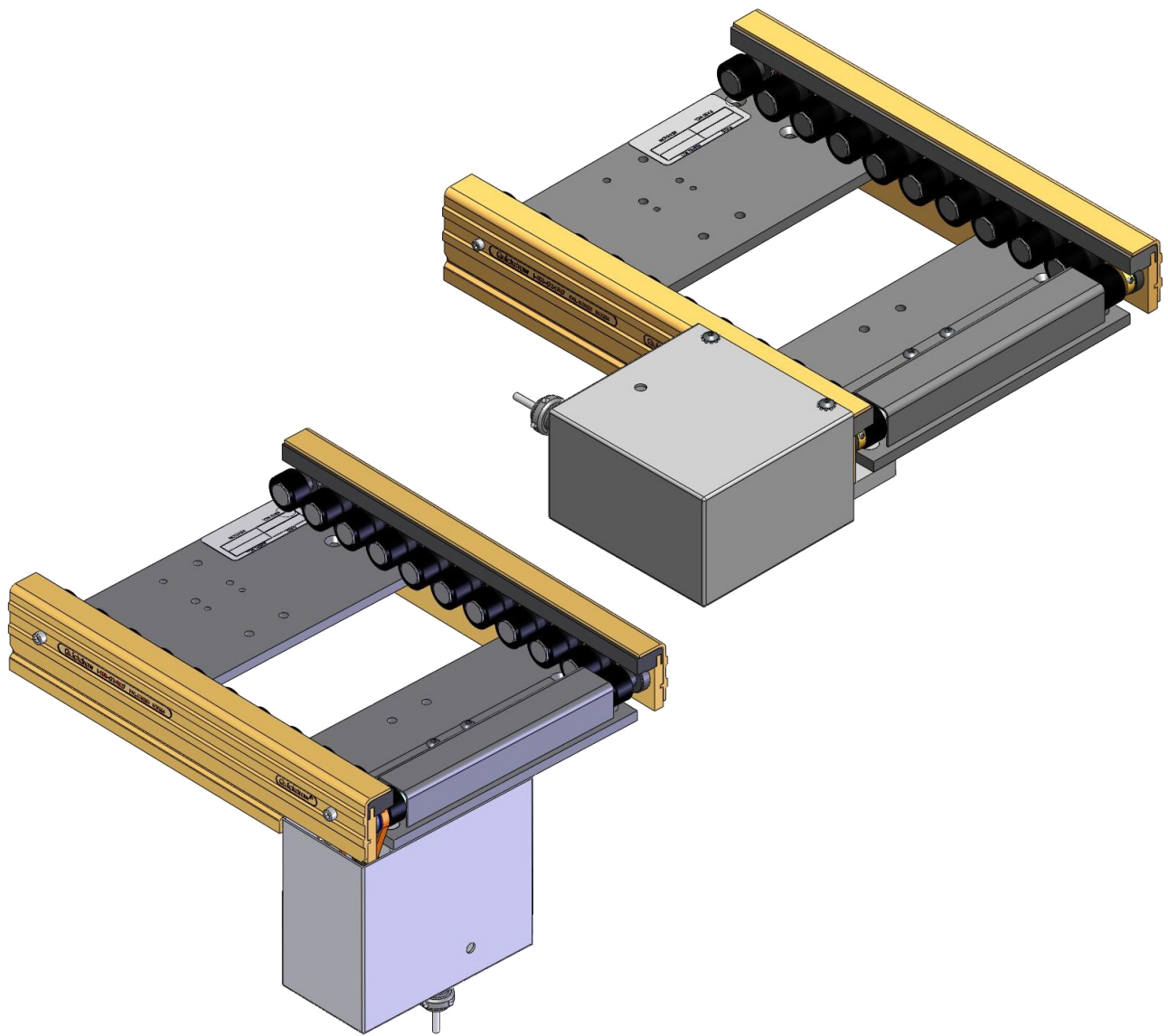


# Quickdraw®

SYSTEMS

## MR Conveyor Maintenance Guide



## Table of Contents

• Overview	Page 3
• Exploded View Of A Standard MR Conveyor	Page 4
• Exploded View Of A Belt Drive Motor	Page 5
• Exploded View Of A Direct Drive MR Conveyor	Page 6
• Exploded View Of A Powered Rail Conveyor	Page 7
• Powering Conveyors By Hand	Page 8
• Determining a Conveyor's "Right" and "Left"	Page 8
• Preventative Maintenance	Page 9
• Routine Maintenance	Pages 10-17
Pulley / Roller Replacement	Page 10
Collar Clamp Removal	Page 11
Collar Clamp Assembly	Page 11
Motor Pulley Gauging	Page 12
Drive Belt Removal	Page 13
Drive Belt Attachment	Page 13
Drive Belt Tensioning	Page 14
Belt Drive Motor Replacement	Page 15
Direct Drive Motor Replacement	Page 16
Passive Side Timing Belt Replacement	Page 17
Drive Side Timing Belt Replacement	Page 18
Direct Drive Timing Belt Replacement	Page 19
• Electrical Controls Maintenance	Pages 20-27
Measuring Current Draw	Page 20
Integral Motor Control Card	Pages 21-24
Motor Card Wiring Diagram	Page 25
Motor/Conveyor Direction Change	Page 25
Setting Conveyor Speeds	Page 26
Phase Considerations	Page 27
Electrical Troubleshooting	Page 28
• Troubleshooting	Page 29
• Non-Routine Maintenance	Pages 30 - 31
Drive Post Replacement	Page 30
Rail Replacement	Page 31
• Parts List	Page 32

## Overview

*Quickdraw Conveyors are designed to be the most reliable and easiest to maintain automated process conveyors available. This Guide consists of easy to understand maintenance procedures for your MR Series Conveyor. This Guide also contains a Troubleshooting Section to help technicians identify the potential causes of any problems that may occur.*

*If you require any assistance, technical support or have any questions, please contact Quickdraw's Customer Service Department at:*

### Quickdraw Systems

*Phone: 1-800-473-8837  
(952) 935-6921*

*Fax: (952) 933-5803*

*Internet: [www.qdraw.com](http://www.qdraw.com)*

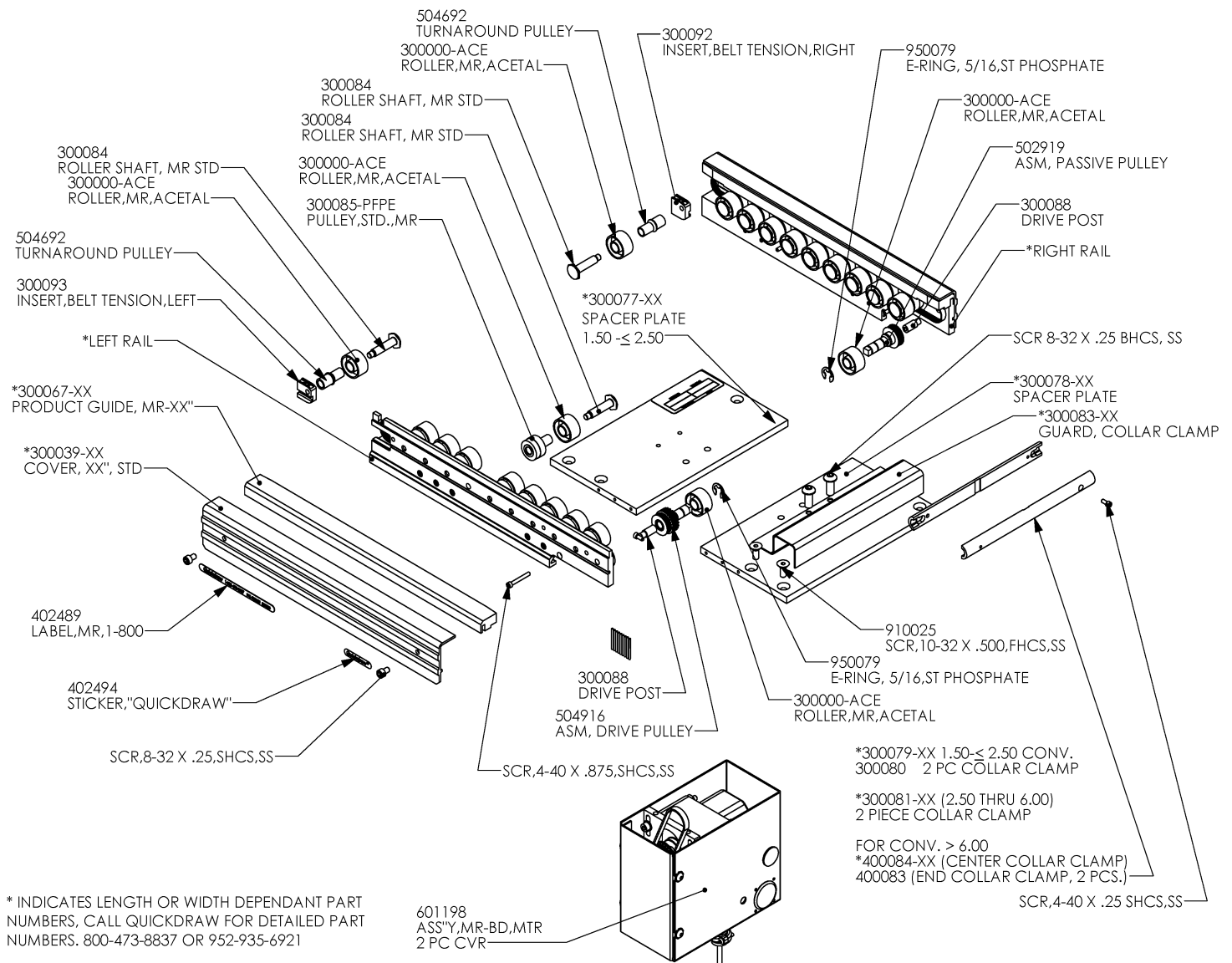
*E-mail: [info@qdraw.com](mailto:info@qdraw.com)*

**Quickdraw Systems  
9650 Newton Ave. S.  
Bloomington, MN 55431**

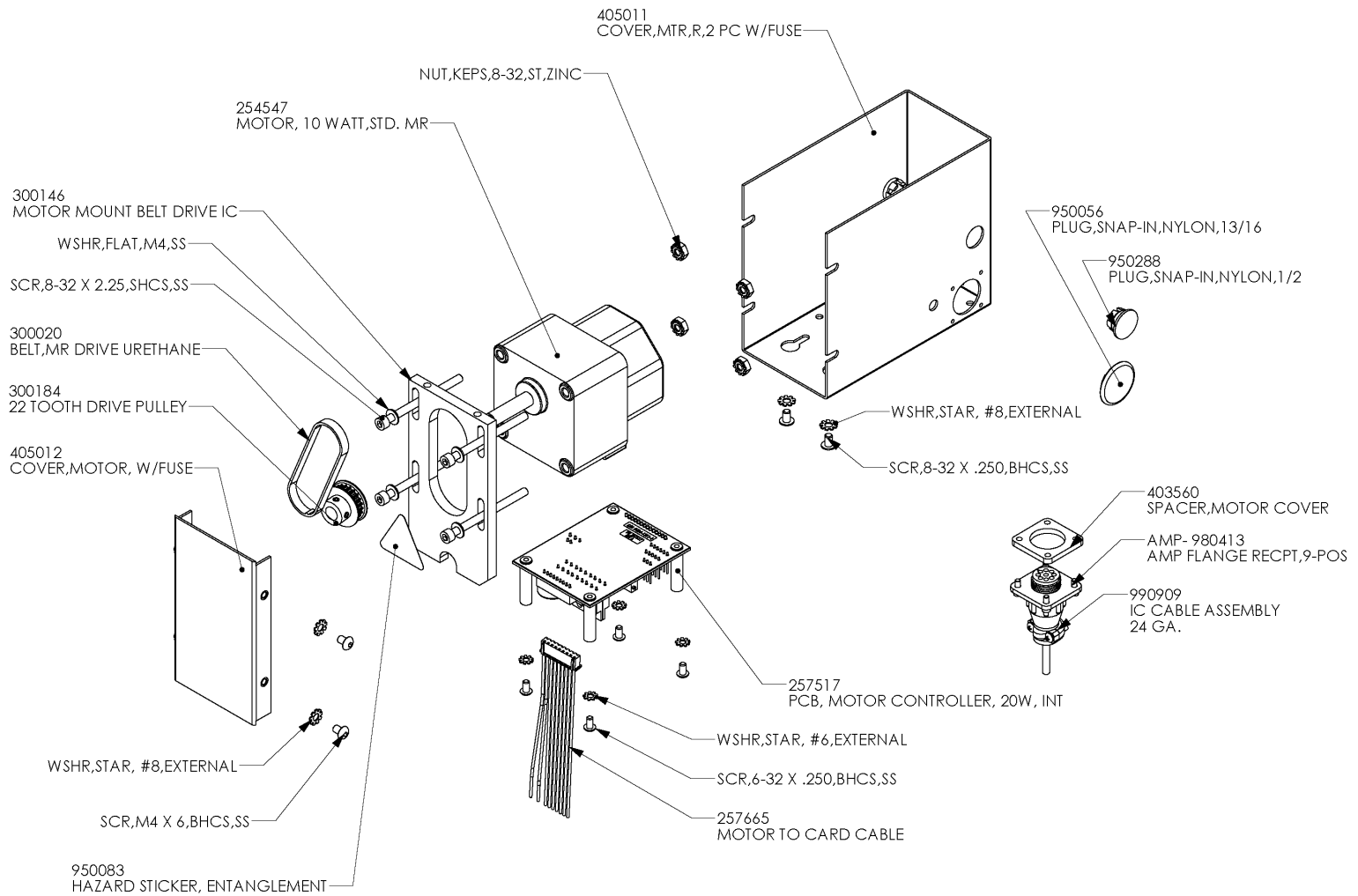
*Note: Some illustrations in this manual include features that may not match or be included on your conveyor system.*

*Note: This maintenance manual is offered in the English language.  
If other languages are required, Quickdraw is not responsible  
for translation.*

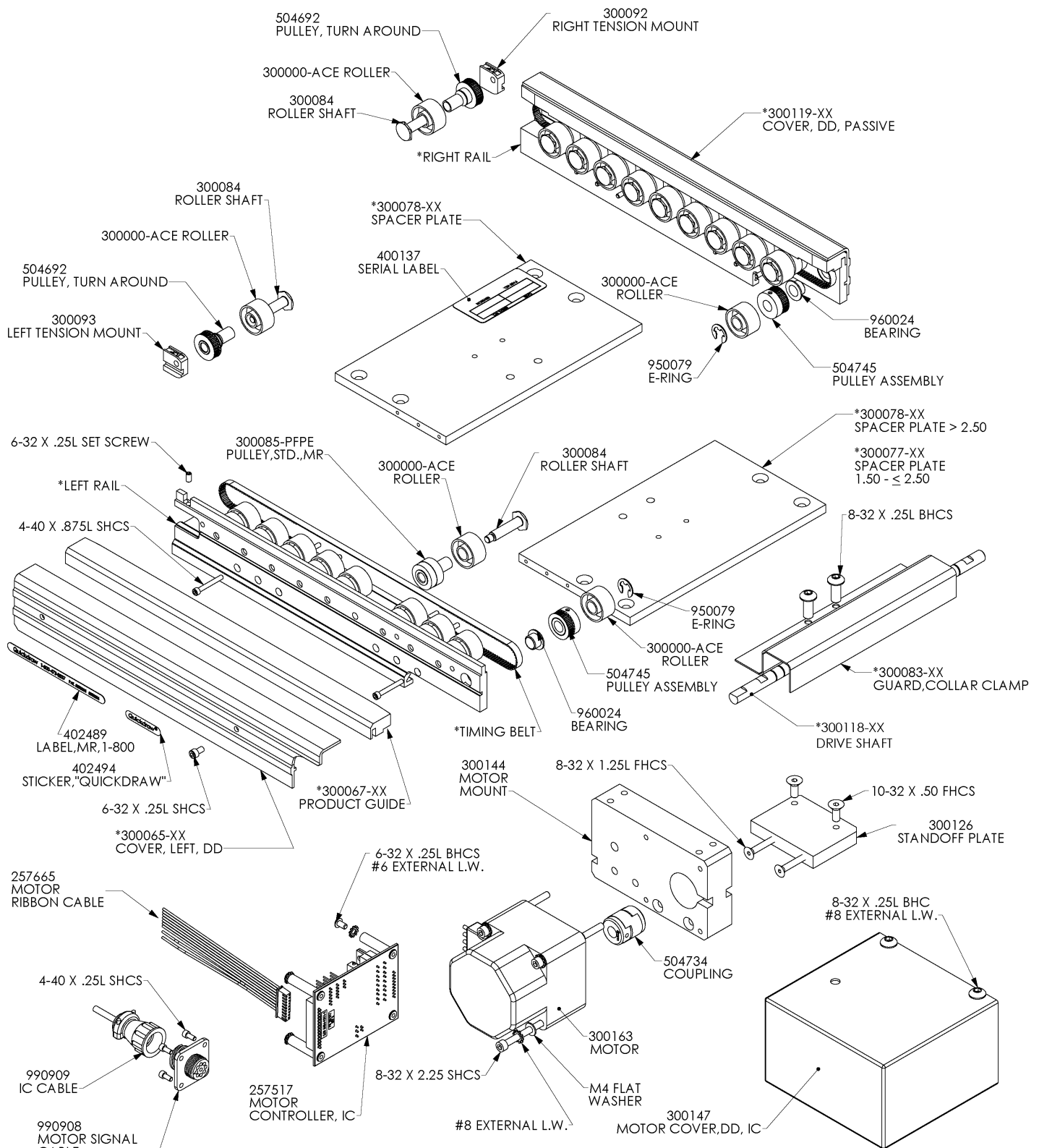
## Exploded View of a Standard BDL MR Conveyor



# Exploded View of a Belt Drive Motor Assembly

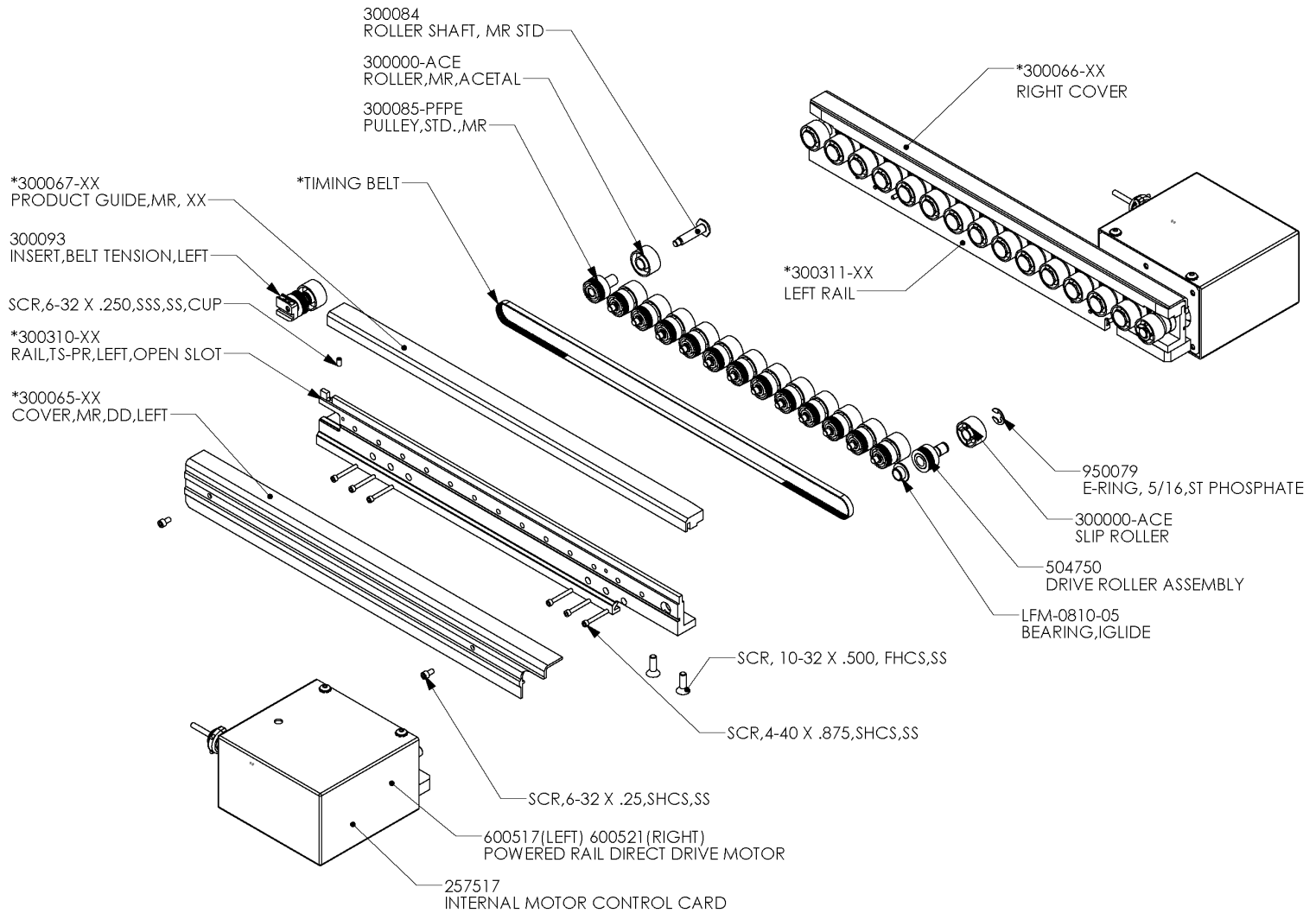


# Exploded View of a Standard DDL MR Conveyor



\* INDICATES LENGTH OR WIDTH DEPENDANT PART NUMBERS. CALL QUICKDRAW FOR DETAILED PART NUMBERS. 800-473-8837 OR 952-935-6921

# Exploded View of a Powered Rail Conveyor



\* INDICATES LENGTH OR WIDTH DEPENDANT PART NUMBERS, CALL QUICKDRAW FOR DETAILED PART NUMBERS:800-473-8837 OR 952-935-6921

---

## Powering Conveyors By Hand

---

*Powering the Conveyor by hand must be done during Cover replacement and after every maintenance procedure prior to connecting the power source. This is done to ensure that the Timing Belts are seated properly onto the teeth of the pulleys.*

**Important:** *Failure to hand-power a conveyor before turning on its motor may result in the following:*

- 1) Blown Fuse*
- 2) Timing Belt Damage*
- 3) Drive Assembly Damage*

### **Procedure:**

- 1) Unplug Power to the Conveyor.
- 2) Turn the Collar Clamp with your fingers. Turn in both directions until the Timing Belts are properly seated. *\*The last direction turned should be the same as the conveyor's direction of flow.*
- 3) To avoid problems, hand-power the conveyor as it is being assembled. *For example:* After assembling the Collar Clamp, hand-power the conveyor. After replacing the Product Guide, hand-power the conveyor. Replace the Cover, then hand-power the conveyor.
- 4) Restore Power to the Conveyor.

### **Troubleshooting:**

- 1) Unplug Power to the Conveyor.
- 2) Remove the Covers and Product Guide one piece at a time until the conveyor can be powered by hand.
- 3) Replace the Product Guide and Covers one piece at a time and hand power after each piece is in place.
- 4) Restore power to the Conveyor.

---

## Determining a Conveyor's "Right" and "Left"

---

### **Procedure:**

- 1) View the Conveyor with the end containing the Motor closest to you.
- 2) As you view the Conveyor from this perspective, the Conveyor is divided into a left and a right side. Use this procedure to determine the correct part.



---

## Preventive Maintenance

---

*The following is a list of procedures that should be followed as a part of a regular maintenance routine.*

### **Procedure For Belt Drive Conveyors:**

- 1) Unplug the Conveyor Power Connector.
- 2) Check the Conveyor to make sure that all Rollers are turning freely.
- 3) Check for wear on the Drive Belt and on the Timing Belts.
- 4) Check to make sure that the Drive Belt is in alignment and properly tensioned.
- 5) Check to make sure that the Conveyor is securely fastened to its frame.
- 6) Always hand-power the Conveyor after maintenance and before start-up.
- 7) Restore Power to the Conveyor.

### **Procedure For Direct Drive Conveyors:**

- 1) Unplug Power to the Conveyor.
- 2) Check the Conveyor to make sure that all Rollers are turning freely.
- 3) Check for wear on the Timing Belts.
- 4) Check to make sure that the Conveyor is securely fastened to its frame.
- 5) Always hand-power the Conveyors after maintenance and before start-up.
- 6) Restore Power to the Conveyor.

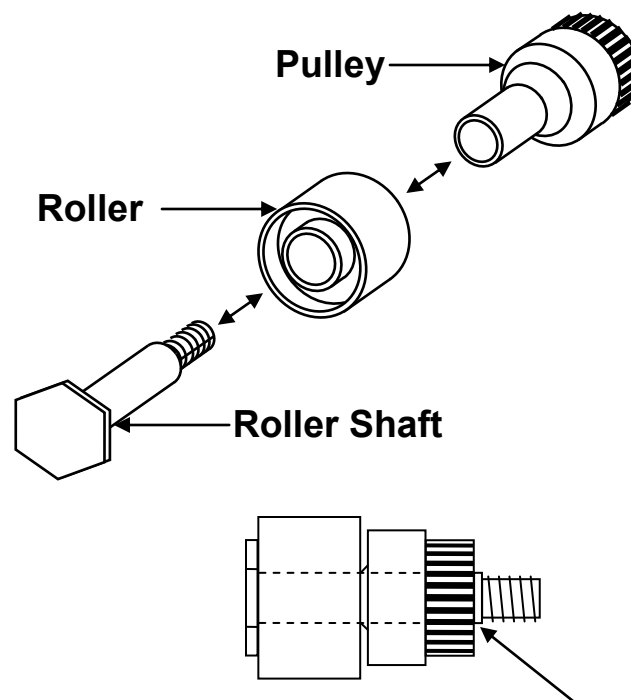
# Routine Maintenance

## Pulley / Roller Replacement

### Procedure:

- 1) Unplug power to the Conveyor.
- 2) Loosen the Shaft from the Rail with a ½" wrench.
- 3) Turn the Shaft out with your fingers.
- 4) Place a new Roller and/or Pulley on the Shaft.
- 5) Make sure that the shoulder of the Shaft extends past the Pulley to prevent the Pulley from being pinched against the Rail (See below).
- 6) Turn the Roller Assembly into the rail with your fingers until snug.
- 7) Using a Torque Wrench set to 32 inch/pounds, tighten the Roller Assembly.
- 8) Hand spin the Pulley and Roller to make sure they spin freely and are not being pinched into the Rail.
- 9) Restore power to the Conveyor.

### **Roller Assembly Diagram**



*Make certain that the Roller Shaft's shoulder extends past the Pulley.*

## Collar Clamp Removal

### Procedure:

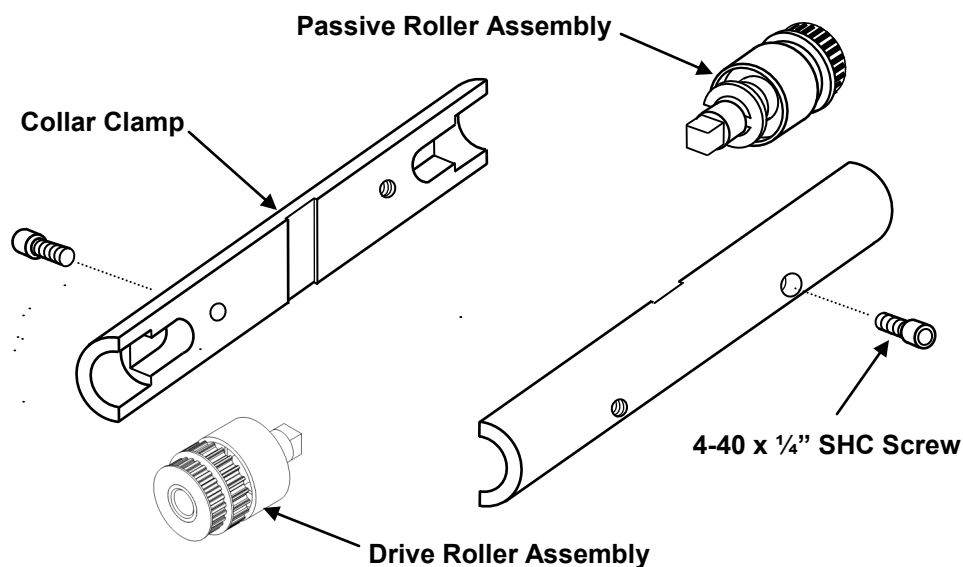
- 1) Unplug power to the Conveyor.
- 2) Remove the 4-40 x 1/4" Socket Head Cap (SHC) Screws from the Collar Clamp.  
(2 screws for narrow clamps, 4 screws for wider clamps)
- 3) Pry the pieces apart using a small, straight-blade screwdriver.

## Collar Clamp Assembly

### Procedure:

- 1) Unplug power to the Conveyor.
- 2) Check the Drive Side and Passive side Pulleys for proper position. The Pulleys should be against the Rails.
- 3) Place one Clamp piece on the Pulleys. Be sure that the piece is as close to centered as possible.
- 4) Place the other Clamp piece on in alignment with the first piece.
- 5) Tighten the Collar Clamp in place by using the following procedure:
  - a) Tighten one 4-40 x 1/4" SHC Screw until snug.
  - b) Tighten the second screw until snug.
  - c) Fully tighten the first screw.
  - d) Fully tighten the second screw.

**Note:** 1.) Three piece clamps use four screws, two at each end. Tighten screws gradually and evenly while keeping parts centered. Rotate the assembly by hand to check.  
2.) Clamps 1.50"— 2.50" use 1 FHCS.



This diagram is of a two piece clamp. Three piece clamps are similar.

---

## Motor Pulley Gauging

---

**Important:** *This procedure is for Belt Drive models.*

*Many problems can occur if the Motor Pulley and the Drive Side Pulley are not properly aligned. Problems created by running a Conveyor with a poorly aligned Drive Belt include:*

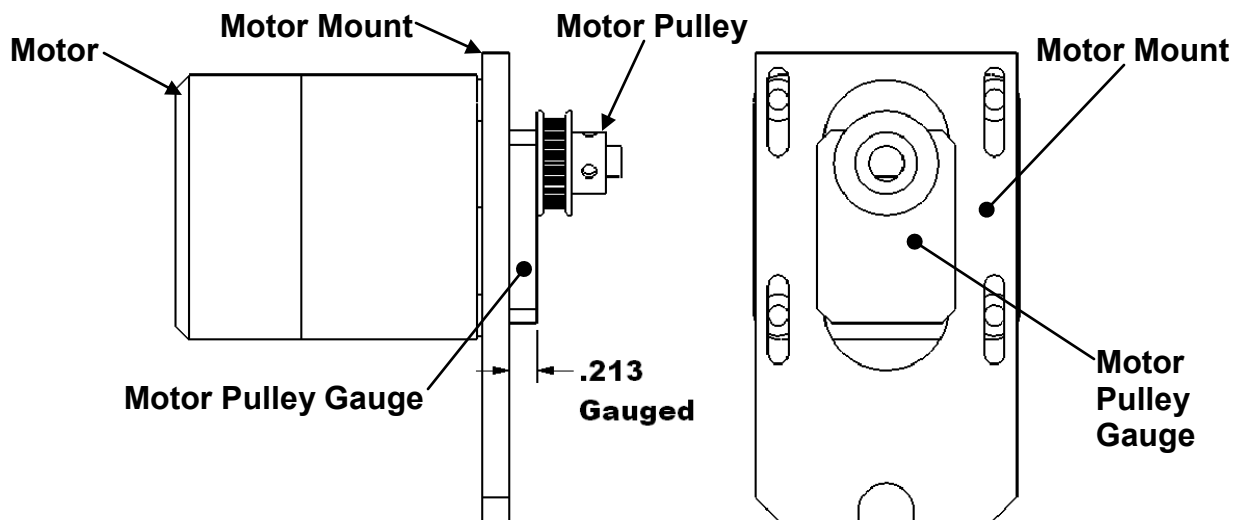
- 1) Worn Drive Components*
- 2) Debris accumulation from pulley wear.*
- 3) Drive Belt breakage*
- 4) Belt noise*
- 5) High current draws*

*The importance of proper Drive Belt alignment cannot be overstated. Therefore, Motor Pulleys should be gauged every time that the Drive Belt is removed or whenever it can easily be gauged as part of another maintenance procedure.*

**Please Note:** *Make sure that the proper Gauge is being used.*

### **Procedure:**

- 1) Unplug power to the Conveyor.
- 2) Remove the Drive Belt (See Page 13).
- 3) Slide the Gauge between the Motor Pulley and the Motor Mount. If the gauge slides in and fits snugly, the Motor Pulley is positioned correctly, skip to procedure number 7. If not, continue to procedure number 4.
- 4) Loosen the set screw(s) on the Motor Pulley.
- 5) Slide the Gauge between the Motor Pulley and the Motor Mount.
- 6) With the Motor tightly held to the Motor Mount, press the Motor Pulley and Gauge to the Motor Mount, tighten the set screw(s).
- 7) Slide the Gauge out.
- 8) Attach the Drive Belt (See Page 13).
- 9) Visually confirm that the Drive Belt is aligned vertically on the Motor Pulley and Drive Side Pulley.



---

## Drive Belt Removal

---

### **Procedure:**

- 1) Unplug Power to the Conveyor
- 2) Remove the Collar Clamp, Drive Side Cover, and Drive Side Product Guide.
- 3) Remove the Motor Cover.
- 4) Loosen the four upper Motor mounting screws.
- 5) Slide the Motor up and remove the Drive Belt from the Motor Pulley.
- 6) Pull the Drive Side Pulley away from the Rail and off of the Drive Post.
- 7) Lift the Drive Belt off of the Drive Side Pulley.

---

## Drive Belt Attachment

---

### **Procedure:**

- 1) Place the Drive Belt on the Drive Side Pulley.
- 2) Put the Timing Belt onto the teeth of the Drive Side Pulley.
- 3) Slide the Drive Side Pulley onto the Drive Post. Turn the Drive Side Pulley with your fingers to ensure that the Timing Belt is properly seated.
- 4) Slide the Motor up and put the Drive Belt around the Motor Pulley. Spin the Pulley until the Belt is properly seated.
- 5) Gauge the Motor Pulley (See Page 12).
- 6) To set the Drive Belt tension, see Page 14.
- 7) Tighten securely using a 9/64" hex wrench and an 11/32" combination wrench.
- 8) Visually check the Drive Belt alignment.
- 9) Reassemble the Collar Clamp (See Page 11).
- 10) Replace the Product Guide.
- 11) Hand power the Conveyor (See Page 8).
- 12) Reattach the Cover.
- 13) Hand power the Conveyor.
- 14) Reattach the Motor Cover.
- 15) Turn on the Conveyor.

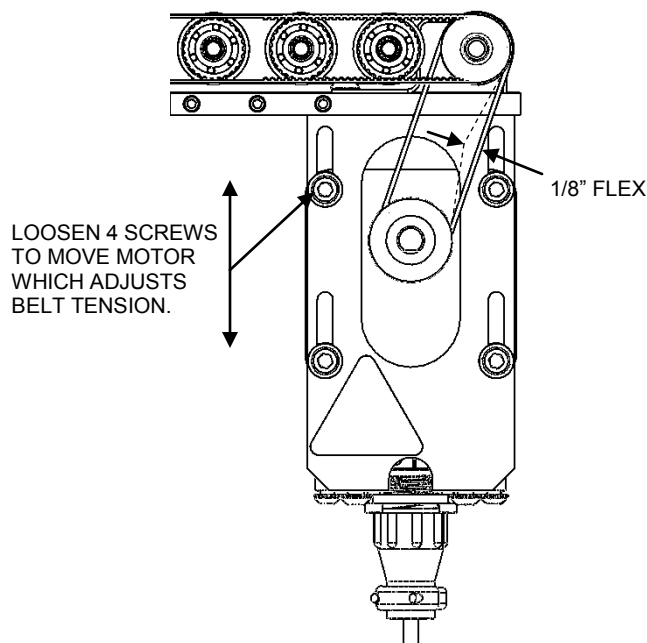
---

## Drive Belt Tensioning

---

- 1) Check the tension on the Belt. There should be about 1/8" of flex. See diagram. If the tension is not properly set, proceed.
- 2) Unplug power to the Conveyor.
- 3) Loosen the four motor mounting screws.
- 4) Let the Motor settle to the bottom.
- 5) Hold the Motor square to the Motor Mount with one hand; tighten the screws until snug with the other hand.
- 6) Check the tension on the Belt. There should be about 1/8" of flex.
- 7) Repeat procedure, if necessary, until proper tension is achieved.
- 8) Fully tighten the screws using an 11/32" wrench to hold the nuts while tightening the screws.
- 9) Hand power the Conveyor.
- 10) Turn on the Conveyor.

***Important:*** Operating a conveyor that has a Drive belt that is too tight will greatly reduce the life of the Drive Belt. Operating a conveyor that has a Drive Belt that is too loose will cause the Drive Belt to skip which will also greatly reduce the life of the Drive Belt and generate noise.



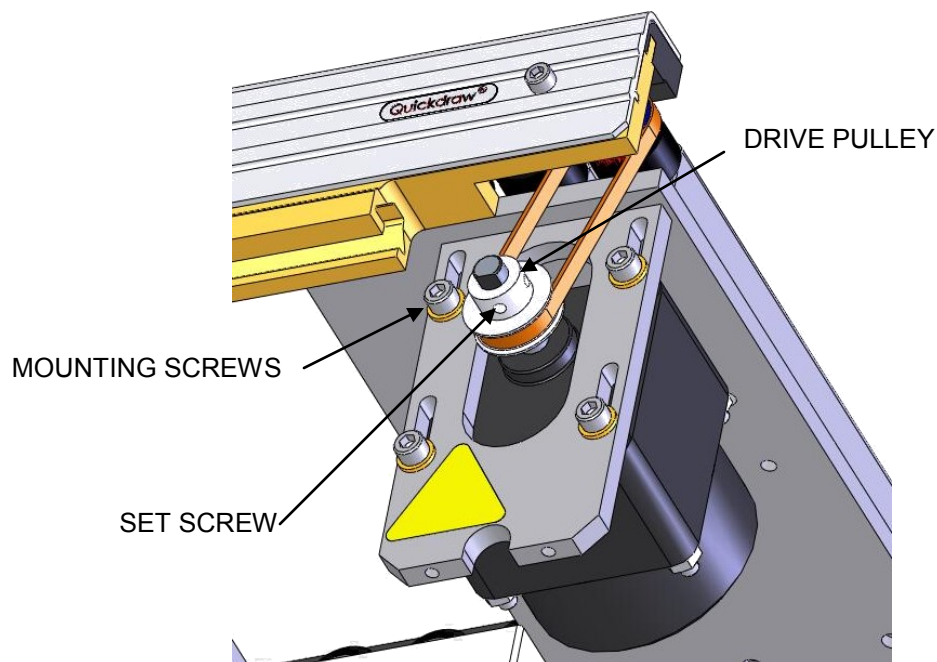
---

## Belt Drive Motor Replacement

---

### Procedure For Belt Drive Models:

- 1) Unplug power to the Conveyor.
- 2) Remove the Motor Cover.
- 3) Unplug the Motor Cable from the Motor.
- 4) Remove the four screws that secure the Motor to the Motor Bracket.
- 5) Lift the Motor up and remove the Drive Belt from the Motor Pulley.
- 6) Remove the Pulley from the old Motor and inspect it for wear.
- 7) Attach the new Motor to the Motor Bracket with the two upper screws.
- 8) Put the Motor Pulley on the Motor Shaft. Align Set Screw to Motor shaft flat.
- 9) Gauge the Motor Pulley (See Page 12).
- 10) Loosen the upper screws and install the remaining screws.
- 11) Reattach the Drive Belt and set the Drive Belt Tension (See Page 14)
- 12) Plug the Motor Cable into the Motor.
- 13) Reattach the Motor Cover. Be sure that there is clearance between the end of the Motor Shaft and the inside of the Motor Cover.
- 14) Hand power the Conveyor (See Page 8).
- 15) Turn on the Conveyor.



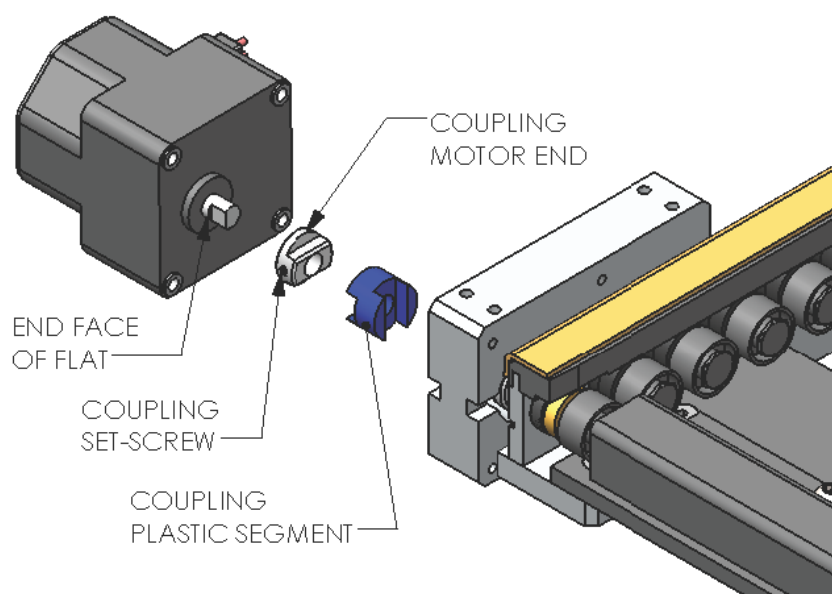
---

## Direct Drive Motor Replacement

---

### Procedure For Direct Drive Models:

- 1) Unplug power to the Conveyor.
- 2) Remove the Motor Cover.
- 3) Unplug the Motor Cable from the Motor.
- 4) Remove the four 8-32 Screws that secure the Motor to the Motor Bracket.
- 5) Remove the Motor. The Motor separates from the Conveyor at the Coupling.
- 6) Loosen the setscrew and remove the part of the Coupling still attached to the Motor shaft. Also, keep the plastic segment (center part of Coupling) with it if it came off too.
- 7) Slide the part of the Coupling from Step 6, above, onto the new Motor shaft. Line up the setscrew with the flat on the Motor shaft. Turn the setscrew down until it just contacts the flat and then slide the Coupling part until it is .025" away from the end face of the flat (use a feeler guage). Tighten it here. This sets the Coupling to the factory position on the Motor Shaft.
- 8) Align the Coupling parts by rotating either the Motor or the Conveyor. Install the new Motor with the four 8-32 Screws.
- 9) Plug the Motor Cable into the Motor.
- 10) Reattach the Motor Cover.
- 11) Hand power the Conveyor (See Page 8).
- 12) Turn on the Conveyor.





---

## Passive Side Timing Belt Replacement

---

### **Procedure for Belt Drive Models:**

- 1) Unplug power to the Conveyor.
- 2) Remove the Passive Side Cover and Product Guide.
- 3) Remove the Collar Clamp (See Page 11).
- 4) Loosen the Belt Tensioner, if necessary.
- 5) Slide the Passive Side Pulley off of the Drive Post.
- 6) Remove the old Timing Belt.
- 7) Check the Drive Post.
- 8) Check the Passive Side Pulley for wear.
- 9) Place the new Timing Belt over the far end pulley. *\* Make sure that the belt is on the teeth of the Pulley.*
- 10) Pull the Belt toward the Motor end. Put the belt on the teeth of the Passive Side Pulley.
- 11) Lubricate the inner shaft of the Passive Side Pulley with a small amount of Krytox Lubricant and slide the Passive side Pulley onto the Drive Post.
- 12) Check the Timing Belt to ensure that it is not twisted or caught on the Rail.  
*\*Turning the Passive Side Pulley with your fingers and a visual check can do this.*
- 13) Tighten the Belt Tensioner, if necessary.
- 14) Reattach the Collar Clamp (See Page 11).
- 15) Replace the Product Guide.
- 16) Hand-Power the Conveyor (See Page 8).
- 17) Reattach the Cover.
- 18) Hand-Power the Conveyor.
- 19) Turn on the Conveyor.

---

## Drive Side Timing Belt Replacement

---

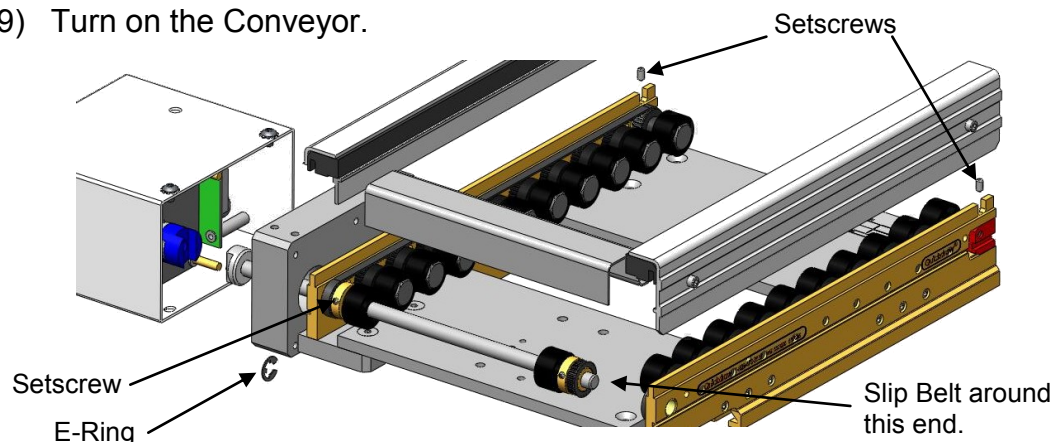
### **Procedure For Belt Drive Models:**

- 1) Unplug power to the Conveyor.
- 2) Remove the Drive Side Cover and Product Guide.
- 3) Remove the Motor Cover.
- 4) Remove the Collar Clamp (See Page 11).
- 5) Loosen but do not remove the two upper Motor mounting screws.
- 6) Slide the Motor up and remove the Drive Belt from the Motor Pulley.
- 7) Pull the Drive Side Pulley away from the Rail and off of the Drive Post.
- 8) Loosen the Belt Tensioner, if necessary.
- 9) Remove the old Timing Belt.
- 10) Check the Drive Post.
- 11) Check the Drive Side Pulley for wear.
- 12) Check the Motor Bracket to insure that it is securely tightened to the Spacer Plate.
- 13) Place the new Timing Belt over the far end Pulley. *\* Be sure that the belt is on the teeth of the Pulley.*
- 14) Pull the Timing Belt towards the Motor end. Put the Belt on the teeth of the Drive Side Pulley.
- 15) Lubricate the inner shaft of the Drive Side Pulley with a small amount of Krytox Lubricant and slide the Drive side Pulley onto the Drive Post.
- 16) Check the Timing Belt to ensure that it is not twisted or caught on the Rail. *\* Turning the Drive Side Pulley with your fingers and a visual check can do this.*
- 17) Reattach the Drive Belt.
- 18) Reattach the Collar Clamp (See Page 11).
- 19) Tighten the Belt Tensioner, if necessary.
- 20) Replace the Product Guide.
- 21) Hand-Power the Conveyor (See Page 8).
- 22) Reattach the Cover.
- 23) Hand-Power the Conveyor.
- 24) Reattach the Motor Cover.
- 25) Turn on the Conveyor.

## Direct Drive Timing Belt Replacement - Either Side

### Procedure :

- 1) Unplug power to the Conveyor.
- 2) Remove both of the Side Covers and Product Guides.
- 3) Remove the Motor and Cover (See Page 16).
- 4) Remove the Collar Clamp Guard.
- 5) Loosen both setscrews at the Belt Tensioners to relax the Timing Belts.
- 6) Remove the drive side E-Ring on the Drive Shaft.
- 7) Loosen the setscrew that locks the drive side Pulley to the Drive Shaft.
- 8) Slide the Drive Shaft out the Motor side of the Conveyor just enough to slip the Timing Belt past the passive end Pulley and Shaft end. You may now remove either Timing Belt.
- 9) Check the Pulleys for wear.
- 10) Slip the replacement Timing Belt over the Drive shaft and reinstall the Drive Shaft into the Passive Pulley and passive side Bearing.
- 11) Position the Drive Shaft end flush with the passive side outside Rail face.
- 12) Slide the Drive Pulley back in to position in line with all Pulleys and tighten the setscrew onto the flat on the Drive Shaft.
- 13) Reinstall the drive side E-Ring.
- 14) Make sure the Belt teeth are fully engaged in the Pulley teeth and then set the Timing Belt Tension and tighten those setscrews (See Page 14). Rotate the Drive Shaft by hand to confirm full tooth engagement.
- 15) Reinstall the Motor and Cover (See Page 16).
- 16) Reinstall the Product Guides and Rail Covers. Rotate the Drive Shaft to maintain Belt tooth engagement as these parts are installed.
- 17) Reinstall the Collar Clamp Guard.
- 18) Rotate the Conveyor by hand (See Page 8).
- 19) Turn on the Conveyor.



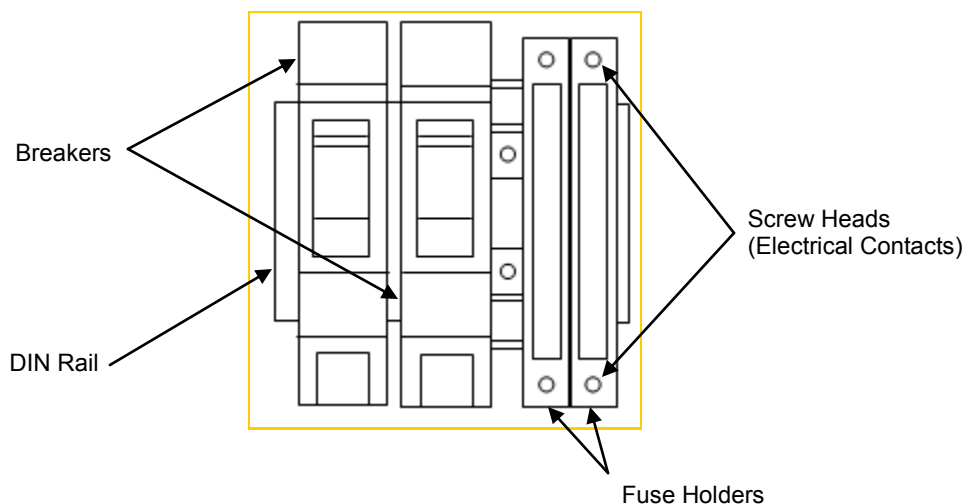
# Electrical Controls Maintenance

## Measuring Current Draw

### Procedure:

**Warning:** This procedure describes testing in an open, powered Control Panel. Use caution.

- 1) In the Control Panel, open the Fuse Cover on the Fuse segment for that specific Conveyor. Opening the cover removes the fuse from the circuit.
- 2) With power on, carefully place the ammeter's Probes on the screw heads as indicated in the diagram. The conveyor will "turn on". Take a reading on the meter.
- 3) If the reading is negative, reverse the probes.
- 4) The reading on a standard MR conveyor (unloaded - no product or pallet resistance) should be less than or equal to 0.50 amps.
- 5) If the reading exceeds this, see the Trouble Shooting -High Current section of this Manual (Page 29).
- 6) Remove the Ammeter and close the Fuse segment cover. Close the Control Panel cover.



Example of Breakers and Fuse Holders mounted on DIN Rail inside a control Panel.

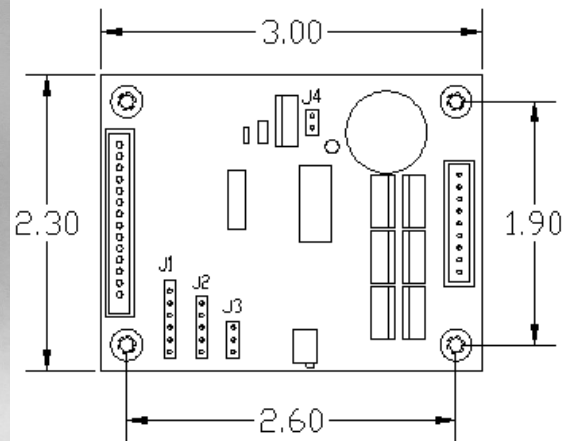
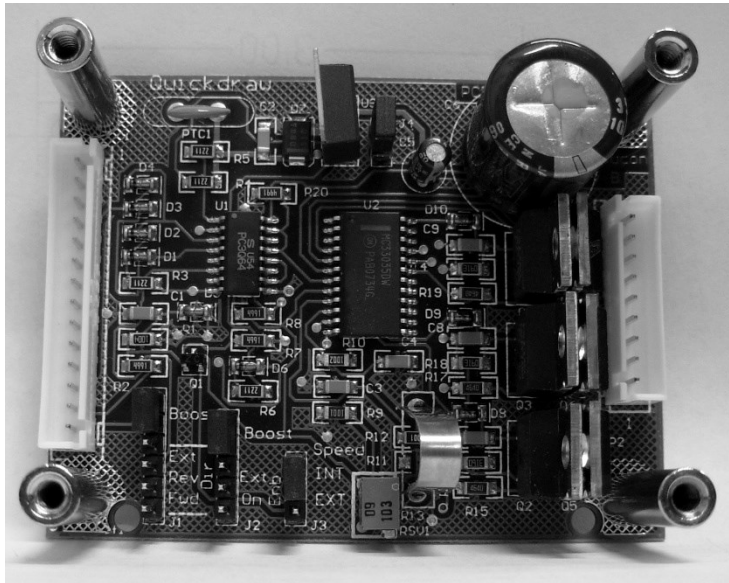
**Note:** Quickdraw Conveyors with a standard 10W Motor should draw no more than 0.50 amps unloaded.

## Integral Motor Controller

### Introduction:

Quickdraw's brushless DC (BLDC) motor controller commutates power into a standard three phase brushless (BLDC) motor up to a 10-watt motor. The BLDC controls (i.e. speed, direction, enabling) can be set by using jumpers or by giving external signals to connector P1.

### Controller Dimension Diagram



6-32 tapped standoff on board

**Connections:** Power and Control Signals, Brushless Motors and Hall Sensors.

### Brushless Motors:

Brushless DC motors have eight (8) wires; three (3) phase lines to the motor, three (3) Hall sensor lines, and sensor power and common. Also BLDC motors come with two sensor configurations. 60, and 120 degrees and is connected to P2.

Quickdraw designed this controller to power Japan servo 3W and 10W motors, although other motors can be driven with this controller.

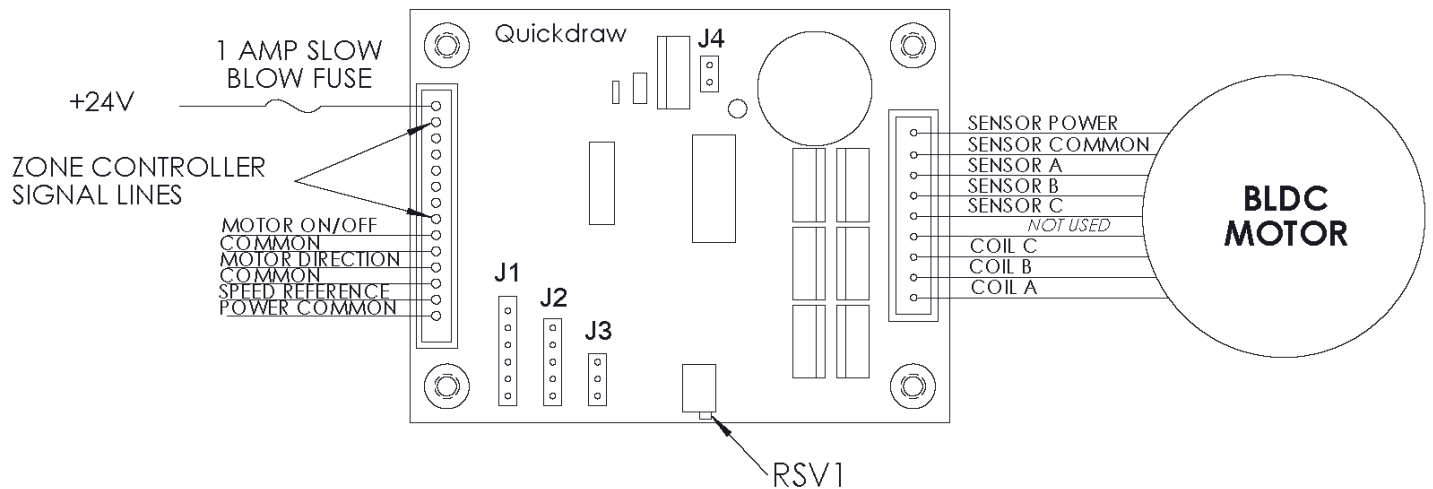
### Motor Sensor Spacing:

Quickdraw's BLDC controller is shipped ready for 120-Degree sensor spacing. (*Note: The Japan Servomotors supplied on most Quickdraw conveyors use 120 Degree sensor spacing*) However, if 60-degree spacing is desired, remove the jumper across J4.

### Power Requirements:

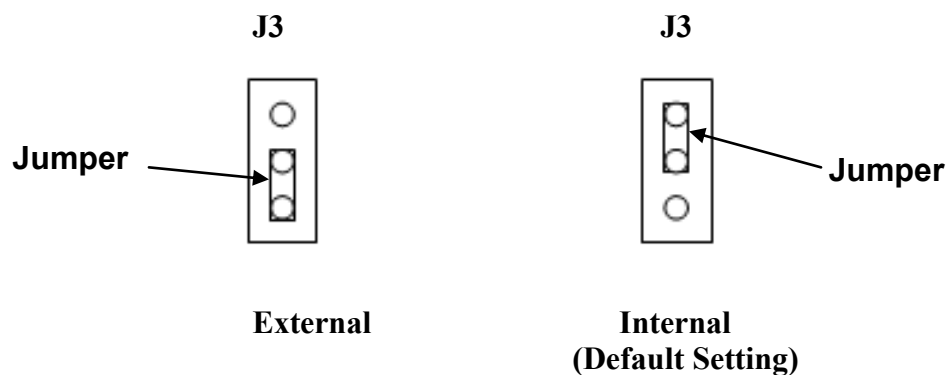
The power is supplied to this card using Pin 1 and Pin 14 on connector P1. The 24V input signal should be fused with a 1-amp slow blow fuse. The power should be off until the hookup procedure is complete and you are ready to run.

## Integral Motor Controller, Cont'd



### Motor Speed Control:

Quickdraw's BLDC controller comes with two speed control options. The different control options can be selected by changing the position of jumper J3 on the motor controller board. When internal speed control is selected with the jumpers, the motor references the multi turn pot (RSV1) on the controller board for speed. The speed can be increased or decreased by turning the pot with a non-conducting screwdriver.

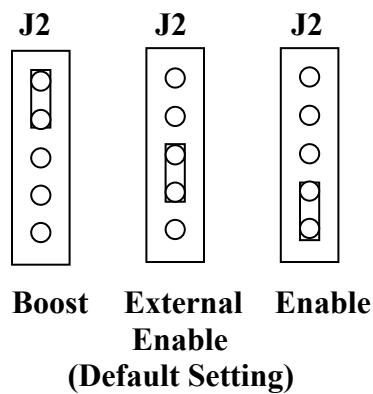


**Motor Controller speed control options.**

When the external speed control is selected, the speed pot is disabled and the motor gets its speed reference from an external 2-5V signal. This signal should be reference to the controller's common.

**Motor Enabling Control:**

Quickdraw's BLDC controller has three modes for controlling the motor: boost, external enable, and always on.

**Motor Controller Enabling Options.**

Motor Boost mode uses control signals from another controller and amplifies those signals for use on higher wattage motors. These connections are made through P1.

Motor External Enable mode uses the control signal on P1-9. This pin is brought to common P1-10 through a jumper wire, switch, relay, or an open collector NPN transistor.

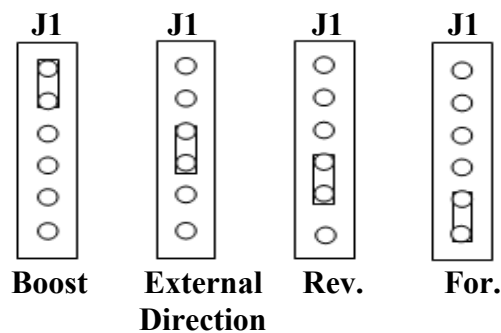
Motor Enable mode; the motor is always on.

Unless specified otherwise by the customer, the default setting for this jumper is “External Enable”.

**Motor Directional Control:**

Quickdraw's BLDC controller has four modes for controlling the motor direction: boost, external direction, always forward, or always reverse. This controller is not designed for plug reversing. Damage to the controller could happen by not stopping it first.

It may be necessary to reverse the motor without changing the directional controls. This can be accomplished by changing P2-1 with P2-3 and P2-6 with P2-5.

**Motor Controller Directional options.**

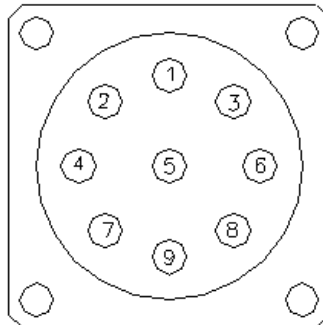
- Motor direction is specified by the Customer.
- Motor Boost mode uses directional control signals from another controller and amplifies those signals for use on higher wattage motors. These connections are made through P1.

- Motor External Direction mode uses the control signal on P1-11. This pin is brought to common P1-12 through a jumper wire, switch, relay, or an open collector NPN transistor.
- Motor Forward mode, the motor will always rotate clockwise (view facing shaft end).
- Motor Reverse mode, the motor will always run counterclockwise.

## SPECIFICATIONS:

BOARD OUTSIDE DIMENSION.....	2.3" x 3"
MOUNTING HOLE DIMENSION.....	1.9" x 2.6"
INPUT VOLTAGE .....	24Vdc
OUTPUT VOLTAGE .....	0 to 24Vdc
MOTOR HALL SPACING (jumper selectable) .....	60° or 120°
LOAD CURRENT (continuous) .....	2.5 Amps continuous
SPEED RANGE .....	0-100%, full range
INPUT CONNECTIONS .....	14-pin JST
OUTPUT CONNECTIONS .....	9-pin JST
SPEED COMMAND SIGNAL .....	2-5Vdc
DIRECTIONAL COMMAND SIGNAL .....	Switched to common
MOTOR CONTROL SIGNAL .....	Switched to common
OPERATING TEMPERATURE .....	32° - 95° F
INTERNAL VOLTAGE SUPPLY (for hall sensors) .....	6.25 Volts

### Conveyor Interface Connector:

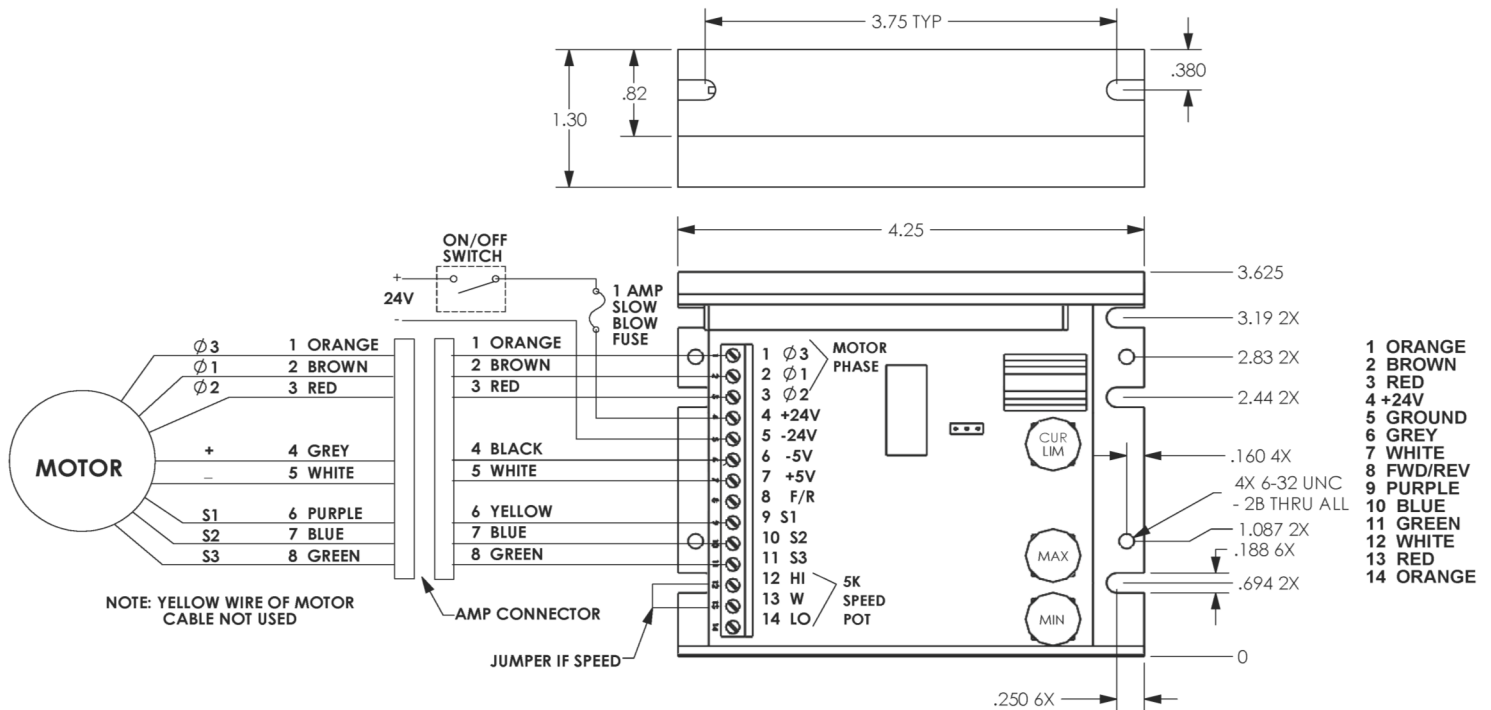


AMP 11-9 Connector  
Quickdraw PN—980413

PIN #	DESCRIPTION	STANDARD CABLE COLOR	FLEX CABLE COLOR
1	+24V Source	Orange	Pink
2	Motor ON/OFF	Brown	Brown
3	Motor ON/OFF Common	Red	Red
4	Motor Direction	Black	Gray
5	Motor Direction Common	White	White
6	Speed Reference (0-5VDC)	Blue	Blue
7	Source Common	Green	Green
8	N/C	X	X
9	N/C	X	X



## Motor Control Card Wiring Diagram



## Wiring Diagram For The Dart 730BDC

**Please Note:** The enclosed Speed Pot is connected as follows: White to 12; Red to 13; and Orange to 14. To eliminate the Speed Pot, jumper Terminals 12 & 13 and set speed using on-board controls.

## Motor Cable Wiring Guide

Pin	Ribbon Cable	Pin	8 Conductor Cable
1	Orange	1	Orange
2	Brown	2	Brown
3	Red	3	Red
4	Grey	4	Black
5	White	5	White
6	Purple	6	Yellow
7	Blue	7	Blue
8	Green	8	Green

**Note:** the Yellow Wire is Not Used on the Ribbon Cable.

## Procedure to Change direction— Dart DC Brushless 730BDC Card:

- 1) Unplug power to Conveyor.
- 2) Locate the Motor Control Card that is operating in the wrong direction.
- 3) Turn off power.
- 4) Unplug the Conveyor Control Box from electrical power.
- 5) Check the Control Card for a wire jumper connecting Terminals #5 and #8.
- 6) If there is a jumper wire, remove the wire to change the direction of flow.
- 7) If there is no jumper, insert a wire jumper to change the direction of flow.
- 8) Plug in the Conveyor Control Box.
- 9) Turn on the power.

---

## Setting Conveyor Speeds

---

***Unless otherwise requested, Quickdraw sets all MR Conveyor Speeds at 50 ft./min. for all MR Conveyor Systems that include Conveyor Control Boxes. Quickdraw does this to standardize its conveyor performance data. The Motor Cards used on most applications come with Speed Potentiometers (Speed Pots) that can either be used or discarded. Most customers choose not to use the Speed Potentiometers, but rather set speed with Min/Max Speed Pots directly attached to the board.***

### How To Determine Conveyor Speed

#### **Procedure:**

- 1) Place a piece of non-reflective tape around the Collar Clamp. \* *This is done to ensure that the Tachometer is reading only the reflection of the special reflective tape.*
- 2) Place a small piece of reflective tape onto the other tape.
- 3) Turn on the conveyor.
- 4) Measure the rpm with a Handheld Optical Digital Tachometer, such as the "AMETEK Model 1726 Optical Digital Tachometer".

### How To Convert Linear Distance/Minute to Target RPM

#### **Procedure:**

- 1) Establish the needed conveyor flow rate. \* *For example: 50 ft/min.*
- 2) Determine the diameter of a Roller. \* *The diameter of a standard Roller is 0.827".*
- 3) Use the following formula to determine the target rpm:  

$$\text{Target RPM} = \text{Linear Speed (ft/min)} / \{\pi * \text{roller diameter (in feet)}\}$$
  - Target RPM = 50 ft/min. /  $\pi * (0.827"/12)/\text{ft}$
  - Target RPM = 50 ft/min. /  $\pi * 0.069 \text{ ft.}$
  - Target RPM = 50 ft/min. / 0.217 ft.
  - Target RPM = 231 rpm

#### **Procedure For Conveyors Equipped With Dart 730 BDC Control Cards:**

##### **With Speed Pot:**

- 1) Turn the dial on Speed Pot until the tachometer reads target rpm.
- 2) If unable to achieve target rpm, adjust the white Min and Max dials found on the Motor Control Card until the target rpm can be achieved within the range of the Speed Pot.

##### **Without Speed Pot:**

- 1) Adjust the white Min and Max dials found on the Motor Control Card until the target rpm can be achieved.

---

## Phase Considerations

---

For most applications, Quickdraw Systems uses low voltage, Brushless DC 3-Phase Motors and Control Cards. Occasionally, a faulty phase may be the problem. Signs of a bad phase include but are not limited to:

- a) Intermittent Motor Failure.
- b) The ability to start the Motor by turning the Collar Clamp or Motor Shaft after initial powering-up of the Conveyor. After the Motor has been finger started, the Motor turns on its own, but again may intermittently have a start up problem.

To remedy this situation, follow the Electrical Troubleshooting guide on the following page. Make certain to turn the Conveyor on and off multiple times to make sure that the real cause of the problem is found.

---

## Electrical Troubleshooting

---

### **Procedure:**

- 1) Check all electrical connections. Make sure that all plugs are connected properly.
- 2) Make sure that it is an electrical problem by eliminating the Conveyor as a possible cause of failure:
  - a) Measure the current draw (See Page 20).
  - b) Hand power the Conveyor.
  - c) Attach the Conveyor to a Motor Cable that is connected to a different, functioning Motor Control Card. *\* Use a different Conveyor Control Box if possible.*
  - d) Measure the current draw.
- 3) If the Conveyor turns by hand, and operates within an acceptable current draw range when connected to a different Motor Control Card, the problem lies somewhere in the original electrical system.

Possible causes include:

  - a) Electrical connections.
  - b) The Motor.
  - c) The Motor Cable.
  - d) The Power Supply.
- 4) To check the Motor, plug the electrical system in question into a different Conveyor. If the new Conveyor operates properly, the Motor on the original Conveyor is probably the cause and should be replaced.
- 5) To check the Motor Cable, switch Cables with a Conveyor that is operating properly. If the problem disappears, check the original Cable for bad electrical connections or cuts. If the original Cable cannot be repaired, then it must be replaced.
- 6) Unplug the Conveyor Control Box and check for loose connections or cut wires within the Control Box. Be careful not to create additional problems by pulling too forcefully on the wires. If you believe that you have found loose wiring and have taken steps to reconnect them properly, plug in the Control Box and measure the current draw of the original system. If the current draw is within the acceptable range, you have fixed the problem. If not, proceed to step #7.
- 7) If you still have not found the problem, replace the Motor Card using the Wiring Diagram on Pages 21 - 24 as a guide.<sup>3</sup>
- 8) If this does not eliminate the problem, please call a Quickdraw Systems representative for support at 1-800-473-8837 or (952) 935-6921.

## Troubleshooting

**Important:** *When performing any maintenance, make certain that the Drive Assembly is free to turn before applying power to the Motor.*

Problem	Possible Cause(s)	Solution
<b>Conveyor Rollers are not turning.</b>	a) Is the Motor turning? b) Is the Drive Belt OK? c) Are the Covers on tightly?	a) If not, refer to Motor problems. b) Check the Drive Belt. c) Loosen and retighten the Covers to ensure that the Guides are in contact with Timing Belt.
<b>The Motor is not turning.</b>	a) Is a fuse blown? b) Is the speed adjustment turned down? c) Is there a faulty connection? d) Is the Motor Control Card receiving 24VDC?	a) Replace blown fuse. b) Adjust the speed on the Motor Control Card. c) Check to see that the Motor is plugged in and no wires are loose on the Motor Control Card. d) Use a volt meter and check the potential across terminal numbers 4 and 5 of the Control Card.
<b>The Motor will turn, but only when started by hand.</b>	a) If the Motor will not start on it's own, but will run if manually started, the Motor Control Card is likely at fault. b) Is it a faulty Motor or Motor Control Card? c) Is it a bad wire connection?	a) Replace the Control Card. b) Try another Motor on this Control Card and/or this Motor on another Control Card. Replace the defective component. c) Check the connections between the Motor Control Card and the Motor. Repair any loose connections.
<b>Motor Fuses continually blow. (High Current)</b>	a) Is the Conveyor assembled correctly? b) Is it a bad Motor or Motor Control Card?	a) Check that the Drive Assembly turns easily by hand. b) Try another Motor on this Control Card and/or this Motor on another Control Card. Replace the defective component.

# **Non-Routine Maintenance**

---

## **Drive Post Replacement**

---

### **Procedure For Belt Drive Models:**

- 1) Unplug power to Conveyor.
- 2) Remove the Motor Cover.
- 3) Remove the Covers and the Product Guide.
- 4) Remove the Collar Clamp (See Page 11).
- 5) Remove the Drive belt (See Page 13).
- 6) Pull the Drive Side Pulley and Passive Side Pulley away from the Rails and off of the Drive Posts.
- 7) Remove the Drive Post(s).
- 8) If necessary, use a 10-32 tap to re-tap the Drive Post hole(s). Tap from the outside of the Rail towards the inside.
- 9) Inspect the 10-32 hole, if the hole will not allow the Drive Post to be securely and squarely attached to the Rail, the Rail will have to be replaced.
- 10) Place a small amount of "Loctite 242" onto the threads of the new Drive Post (s) and tighten onto the Rail(s).
- 11) Slide the Passive Side Pulley and the Drive Side Pulley (with Timing Belts) onto the Drive Posts.
- 12) Attach the Drive Belt (See Page 13).
- 13) Assemble the Collar Clamp (See Page 11).
- 14) Replace the Product guide.
- 15) Hand Power the Conveyor (See Page 8).
- 16) Replace the Covers.
- 17) Hand Power the Conveyor.
- 18) Replace the Motor Cover.
- 19) Turn on the Conveyor.

## Non-Routine Maintenance (cont.)

---

### **Rail Replacement-Belt Drive or Direct Drive**

---

#### **Procedure:**

- 1) Unplug power to the Conveyor.
- 2) Remove the Cover and the Product Guide.
- 3) Remove the Collar Clamp (See Page 11) for Belt Drive Models.
- 4) If you are replacing the Drive Side Rail, remove the Drive Belt (See Page 13).
- 5) For Belt Drive Models, slide the Drive Side Pulley or the Passive Side Pulley off of the Drive Post (Depending upon which Rail is being replaced).
- 6) For Direct Drive Models, remove the Motor and Drive Shaft, (See Page 16, Steps 1-8)
- 7) Remove the 4-40 x 7/8" SHC Screws that hold the Rail to the Spacer Plates.
- 8) Remove the Rail.
- 9) Transfer the Roller Assemblies (Rollers, Pulleys and Shafts) to the new Rail.
- 10) Tighten the Roller Assemblies with a Torque wrench set at approximately 32 in/lbs.
- 11) Place a small amount of Loctite onto the threads of the Drive Post.
- 12) Tighten the Drive Post to the Rail.
- 13) Attach the new Rail to the Spacer Plates.
- 14) Replace the Timing Belt(s) as follows:
  - a) For the Passive Side Timing Belt, See Page 17.
  - b) For the Drive Side Timing Belt on Chain or Belt Drive models, See Page 18.
  - c) For the Drive Side Timing Belt on Direct Drive models, See Pages 19, Steps 10-19. Skip the remaining steps.
- 14) Reattach the Collar Clamp (See Page 11) for Belt Drive Models.
- 15) Reattach the Product Guide .
- 16) Hand Power the Conveyor (See Page 8).
- 17) Reattach the Cover.
- 18) Hand Power the Conveyor.
- 19) Turn on the Conveyor.

## Conveyor Components Parts List

<b>*300078</b>	Spacer Plate (Conveyor widths 2.50" and wider)
254547	DC Variable Speed Motor/Gearbox (10W)
404357	External Motor Control Card
257517	Internal Motor Control Card
257665	Motor Ribbon Cable, IC
300084	Roller Shaft, Standard
300088	Drive Post
300107	Edge Handling Shaft
300108	Edge Handling Pulley
300163	Std. 10 Watt Motor Modified for DD Conveyors.
300020	Drive Belt
300184	Motor Pulley (BD)
400678	Edge Handling Roller, Machined
404357	Mounted D-Drive 730 (730BDC)
502919	Passive Side Assembly.
504009	4" Connectorized Ribbon Cable
504010	10' Connectorized Motor Cable
504218	10' Controls Enclosure Cable
504692	Turnaround Pulley Assembly
504731	Double Flanged Pulley, EH
504734	DD Coupling, Oldham
504745	DD Pulley Assembly
504750	PR Drive Assembly, DD
504916	Drive Assembly, BD
505230	PR Drive Assembly, BD
505232	PR Drive Assembly, BD, EH
800639	20' High Flex, IC Cable
801251	20' High Flex, External Drive Cable
990908	Motor Signal Cable, IC
990909	15' IC Cable
300000-ACE	Slip Roller, Standard
300085-PFPE	Pulley, Standard
<b>*300077</b>	Spacer Plate (1.50" to $\leq$ 2.50" CW)
<b>*300078</b>	Spacer Plate (Conveyor widths 2.50" and wider)
<b>*300079</b>	1 Piece Collar Clamp
<b>*300080</b>	1 Piece Collar Clamp (1.50 to < 2.50)
<b>*300081</b>	Collar Clamp (Conveyor widths 2.50" and wider)
<b>*300083</b>	Collar Clamp Guard (Conveyors 2" and wider.)
<b>*300118</b>	Drive Shaft (Coupled DD)
<b>*400084</b>	Collar Clamp (Conveyor widths over 6")
504751	PR Drive Assembly, DD, EH

<u>Part Number</u>	<u>Description</u>
300076	6" Timing Belt
256180	9" Timing Belt
300075	11" Timing Belt
256643	15" Timing Belt
300074	17" Timing Belt
300073	22" Timing Belt
300072	30" Timing Belt
300071	35" Timing Belt
300070	39" Timing Belt
300069	48" Timing Belt
300068	60" Timing Belt
300020	Drive Belt, BD Motors

<u>Abbreviation</u>	<u>Key</u>
BD	Belt Drive
DD	Direct Drive
PR	Powered Rail
IC	Internal Control Card
EH	Edge Handling Components

\*Contact Quickdraw Systems for exact part numbers for various width and length driven components.

### Additional Support:

Contact Quickdraw Systems if you have any questions or need parts that aren't listed on this page.

**Phone: 1-800-473-8837 or (952) 935-6921**

**Fax: (952) 933-5803**

**E-mail: [Info@qdraw.com](mailto:Info@qdraw.com)**