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Introduction

This manual provides service procedures and replacement parts for all Nordson automated dispensing systems, including PRO, EV, RV, E, and R Series systems.

Preparation for all Service Procedures

CAUTION

Risk of personal injury or equipment damage. Disconnect power and remove all accessories from the robot before performing any maintenance.

1. Disconnect the power cord from the AC power outlet. The cord must remain visible to the technician performing the maintenance.
2. Remove all accessories from the robot to ensure clear working pathways.

Maintenance

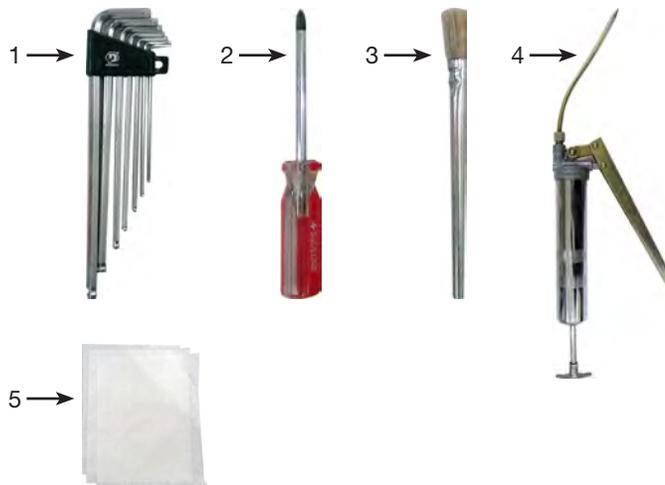
To optimize the performance and life of your automated dispensing system, perform the following maintenance procedures at intervals appropriate for your operating conditions.

Recommended Maintenance Schedule

Procedure	Daily	Every Three (3) Months	Every Six (6) Months
“Exterior Cleaning” on page 4	X		
“Linear Guideway Cleaning: X Axis” on page 4 “Linear Guideway Cleaning: Y Axis” on page 6 “Linear Guideway Cleaning: Z Axis” on page 8		X	
“Applying Grease to the Grease Fittings” on page 12			X
“Control Assembly Cleaning” on page 13			X

Tools and Supplies

- 1 Hex wrench set
- 2 Screwdriver
- 3 Brush
- 4 Grease application tool
- 5 Clean, dry nonwoven cloths
- 6 Hardware kit (not shown — refer to “Hardware Kits” on page 38 for the kit part numbers and contents)



Exterior Cleaning

⚠ CAUTION

Do not use an air gun to clean the exterior of the robot. Doing so can blow debris into the robot.

1. Switch OFF power to the robot and disconnect the power cord.
2. Use a clean, dry, nonwoven cloth to carefully clean the exterior surfaces of the robot and its components.

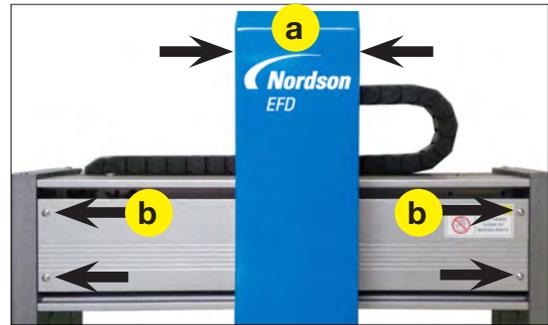
Linear Guideway Cleaning: X Axis

⚠ CAUTION

Risk of injury or equipment damage. Before performing any service procedure, complete the steps under “Preparation for all Service Procedures” on page 3.

Remove the X Axis Front Cover

- 1
 - a. Move the Z axis module to the center of the X axis.
 - b. Remove the four (4) screws that secure the X axis front cover.



- 2
 - a. Move the Z axis module to the left side of the X axis.



- 3
 - a. Carefully pull the X axis front cover until it is slightly open and then pull it away from the X axis. Avoid contact between the X axis front cover and the Z axis module.



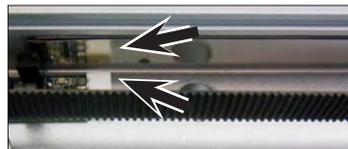
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Linear Guideway Cleaning: X Axis (continued)

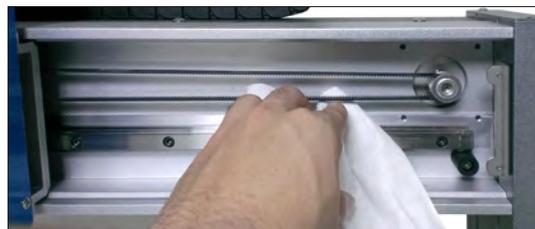
Clean and Grease the X Axis Linear Guideway

CAUTION

PRO Series units have magnetic strips. Use only a clean nonwoven cloth for cleaning. Do not use any oil or chemical liquid on magnetic strips. Also, do not position any magnetic component near the strips.



- 4
 - Use a clean nonwoven cloth to clean any dust and grease from the X axis linear guideway.
 - Move the Z axis module right and left to clean previously inaccessible areas of the X axis linear guideway.



- 5
 - Use the brush and grease from the maintenance grease kit to liberally apply grease to the X axis linear guideway. Move the Z axis back and forth to spread the grease evenly and to ensure the slide travels smoothly on the X axis linear guideway.
 - If the Z axis module does not travel easily, add grease to the grease fitting on the X axis linear guideway. Refer to “Applying Grease to the Grease Fittings” on page 12 for instructions. Return here to continue.



- 6 Use a clean nonwoven cloth to remove excess grease.

Reinstall the X Axis Front Cover

- 7 Move the Z axis module to the left side of the X axis and reinstall the X axis front cover.



- 8 Move the Z axis module to the center of the frame and secure the X axis front cover with the four (4) screws removed previously.



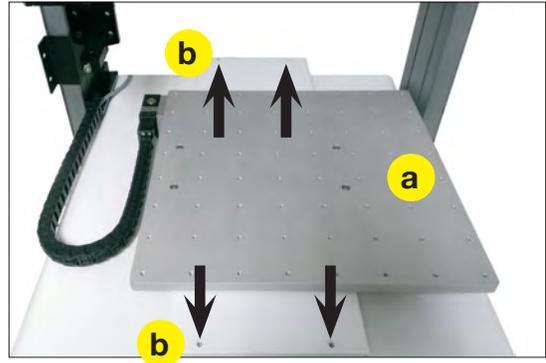
Linear Guideway Cleaning: Y Axis

CAUTION

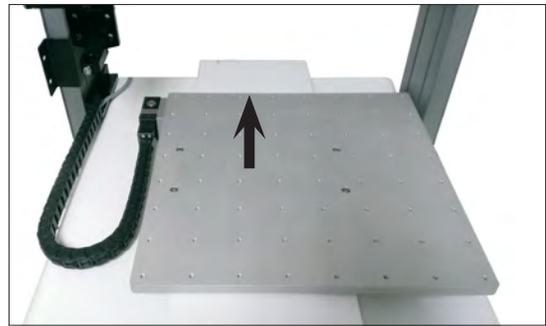
Risk of injury or equipment damage. Before performing any service procedure, complete the steps under “Preparation for all Service Procedures” on page 3.

Remove the Y Axis Cover

- 1
 - a. Move the fixture plate to the center of the Y axis cover.
 - b. Remove the four (4) screws that secure the Y axis cover.



- 2 Move the fixture plate to the very back of the robot.



- 3 Carefully pull the Y axis cover away from the robot.



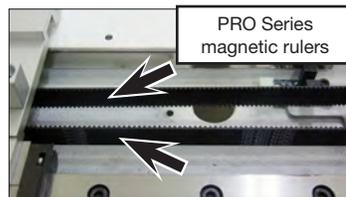
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Linear Guideway Cleaning: X Axis (continued)

Clean and Grease the Y Axis Linear Guideway

CAUTION

PRO Series units have magnetic rulers. Use only a clean nonwoven cloth for cleaning. Do not use any oil or chemical liquid on magnetic rulers. Also, do not position any magnetic component near the rulers.



- 4
 - Use a clean nonwoven cloth to clean any dust and grease from the Y axis linear guideway.
 - Move the fixture plate back and forth to clean previously inaccessible areas of the Y axis linear guideway.



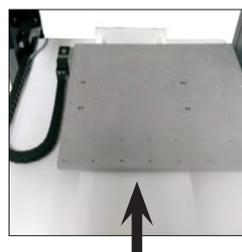
- 5
 - Use the brush and grease from the maintenance grease kit to liberally apply grease to the Y axis linear guideway. Move the fixture plate back and forth to spread the grease evenly and to ensure the slide travels smoothly on the Y axis linear guideway.
 - If the fixture plate does not travel easily, add grease to the grease fitting on the Y axis linear guideway. Refer to “Applying Grease to the Grease Fittings” on page 12 for instructions. Return here to continue.



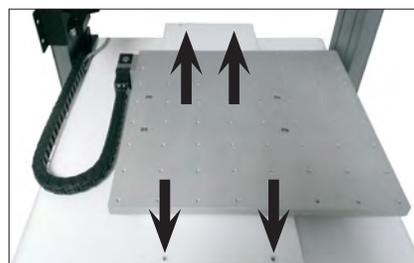
- 6 Use a clean nonwoven cloth to remove excess grease.

Reinstall the Y Axis Cover

- 7 Move the fixture plate to the very back of the robot and slide the Y axis cover back into place.



- 8 Move the fixture plate to the center of the Y axis cover and secure it with the four (4) screws removed previously.



Linear Guideway Cleaning: Z Axis

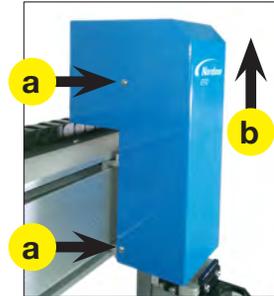
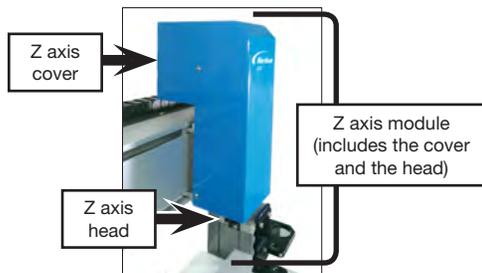
NOTE: This procedure does not apply to R / RV Series units.

⚠ CAUTION

Risk of injury or equipment damage. Before performing any service procedure, complete the steps under “Preparation for all Service Procedures” on page 3.

Remove the Z Axis Cover (All Units Except R / RV Series)

- 1
 - a. Remove the four (4) screws that secure the Z axis cover to the Z axis module.
 - b. Pull up vertically to remove the Z axis cover.



Clean and Grease the Z Axis Linear Guideway

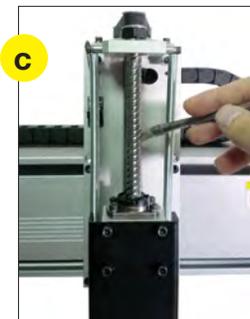
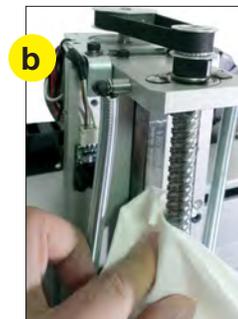
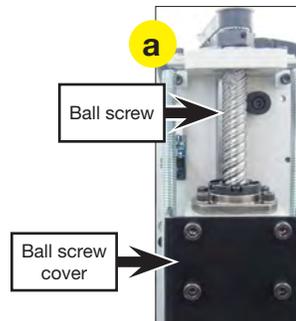
2 (All units except E2 / E2V)

Clean the Z axis as follows:

- a. With the Z axis head in the top position, reach behind the ball screw cover and use a nonwoven cloth to clean any dust and grease from the Z axis linear guideway.
- b. Pull the Z axis head down to fully expose the ball screw and the Z axis linear guideway, then use the nonwoven cloth to continue cleaning dust and grease from the guide.

NOTE: Keep the Z axis head in the bottom position.

- c. Use the brush and grease from the maintenance grease kit to liberally apply grease to the Z axis linear guideway and to the ball screw. After they are lubricated, release the Z axis head from the bottom position and move it up and down to evenly disperse the grease and to ensure that it travels smoothly on the Z axis linear guideway.
- d. If the Z axis module does not travel easily, add grease to the grease fitting on the Z axis linear guideway. Refer to “Applying Grease to the Grease Fittings” on page 12 for instructions. Return here to continue.
- e. Use a clean nonwoven cloth to remove excess grease.



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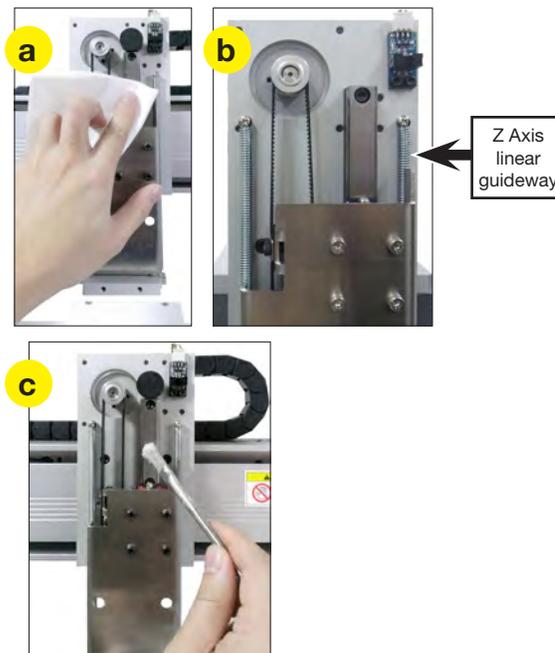
Linear Guideway Cleaning: Z Axis (continued)

Clean and Grease the Z Axis Linear Guideway (continued)

3 (E2/E2V Series only)

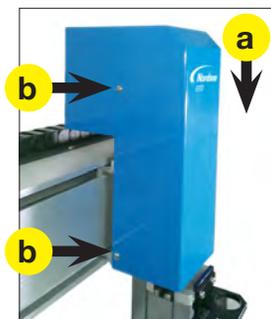
Clean the Z axis as follows:

- a. Use a clean nonwoven cloth to clean any dust and grease from the Z axis linear guideway.
- b. Move the Z axis head down to clean previously inaccessible areas of the Z axis linear guideway.
- c. Use the brush and grease from the maintenance grease kit to liberally apply grease to the Z axis linear guideway. Move the Z axis module up and down to spread the grease evenly and to ensure the slide travels smoothly on the Z axis linear guideway.
- d. If the Z axis module does not travel easily, add grease to the grease fitting on the Z axis linear guideway. Refer to “Applying Grease to the Grease Fittings” on page 12 for instructions. Return here to continue.



Reinstall the Z Axis Cover (All Units Except R / RV Series)

- 4 a. Reinstall the Z axis cover.
- b. Secure the cover with the screws removed previously.



R / RV Series Ball Screw Cleaning: Z and R Axes

NOTE: This procedure applies only to R / RV Series units.

⚠ CAUTION

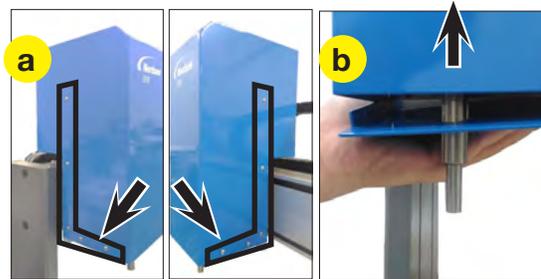
Risk of injury or equipment damage. Before performing any service procedure, complete the steps under “Preparation for all Service Procedures” on page 3.

Remove the Z Axis Cover (R / RV Series Only)

- 1
 - a. Remove the 10 screws that secure the Z axis cover to the Z axis module.
 - b. Carefully pull up vertically to remove the Z axis cover.

NOTE: Removing the four (4) screws near the bottom of the Z axis cover releases the Z axis bottom plate; place your hand underneath the plate to catch it.

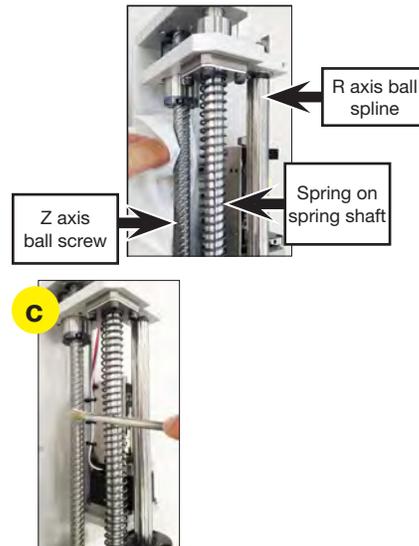
NOTE: The Z axis module can be in any position along the X axis during maintenance.



Clean and Grease the Z Axis Components (R / RV Series Only)

- 2 Clean the Z axis as follows:
 - a. Use a clean nonwoven cloth to clean any dust and grease from the Z axis ball screw, spring, spring shaft, and R axis ball spline.
 - b. Pull the Z axis head down, exposing all components listed above that were previously inaccessible, and clean the dust and grease with the nonwoven cloth.

NOTE: Keep the Z axis head in the down position.
 - c. Use the brush and grease from the maintenance grease kit to liberally apply grease to the Z axis ball screw, spring, spring shaft, and R axis ball spline.
 - d. After greasing, release the Z axis head from the down position and move the Z axis module up and down to disperse the grease evenly on each component.
 - e. Use a clean nonwoven cloth to remove excess grease.



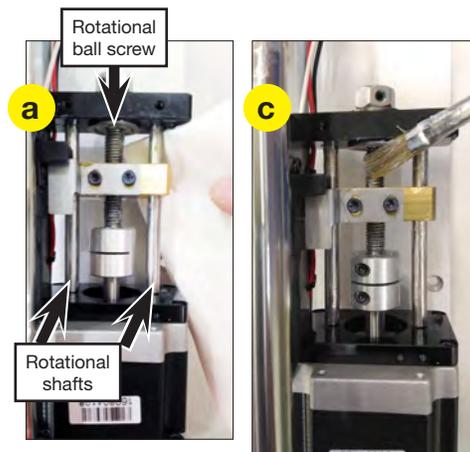
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Linear Guideway Cleaning: Z and R Axes (continued)

Clean and Grease the R Axis Components

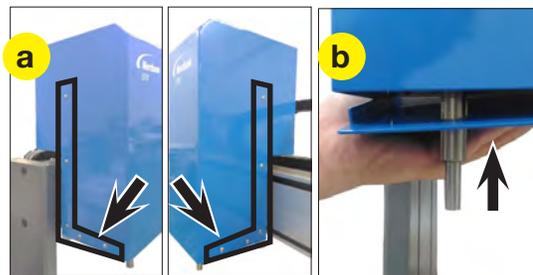
- 3 Clean the R axis as follows:
 - a. Use a clean nonwoven cloth to clean any dust and grease from the rotational ball screw and rotational shafts.
 - b. Rotate the R axis multiple times to expose the parts of the rotational ball screw and rotational shafts previously inaccessible and clean the grease and dust with the nonwoven cloth.

NOTE: Keep the R axis in the rotated position.
 - c. Use the brush and grease from the maintenance grease kit to liberally apply grease to the rotational ball screw and rotational shafts.
 - d. After greasing, release the R axis from the rotated position and then rotate the R axis clockwise and counterclockwise to disperse the grease evenly on the two components.
 - e. Use a clean nonwoven cloth to remove excess grease.



Reinstall the Z Axis Cover (R / RV Series Only)

- 4
 - a. Position the Z axis cover over the Z axis module and vertically lower it to its correct orientation.
 - b. Lift up the Z axis bottom plate and secure the two components with the 10 screws removed previously.



Applying Grease to the Grease Fittings

⚠ CAUTION

Risk of injury or equipment damage. Before performing any service procedure, complete the steps under “Preparation for all Service Procedures” on page 3.

- Before performing this procedure, complete the previous procedures for linear guideway cleaning and greasing:
 - “Linear Guideway Cleaning: X Axis” on page 4
 - “Linear Guideway Cleaning: Y Axis” on page 6
 - “Linear Guideway Cleaning: Z Axis” on page 8
- Using the syringe and grease provided in the greasing kit, fill the syringe with the correct amount of grease based on the robot model. Refer to the table below.

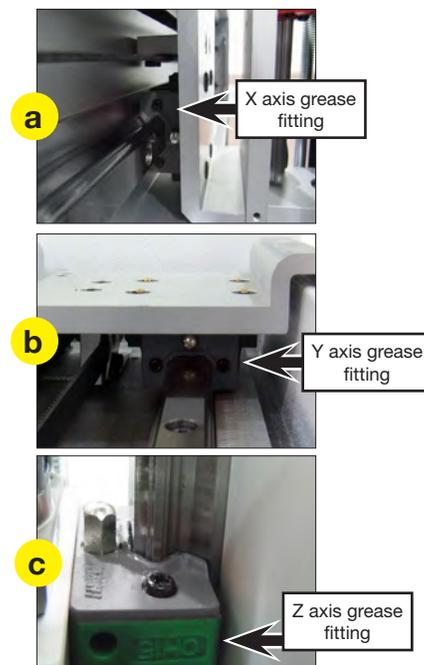
Model	X Axis	Y Axis	Z Axis
	Grease Weight (g)	Grease Weight (g)	Grease Weight (g)
E2	0.95	0.95	0.95
E3	0.95	0.95	0.95
E4	0.95	0.95	0.95
E5	0.95	0.95	0.95
E6	0.95	0.95	0.95
R3 / R3V	0.95	0.95	0.95
R4 / R4V	0.95	0.95	0.95
R6 / R6V	0.95	0.95	0.95
PRO4	0.76	0.57	0.57

- Refer to the removal steps in the previous procedures to remove the X, Y, or Z axis covers. If applicable, remove the four screws that secure the fixture plate and remove it.

As you remove each cover (and the fixture plate, if applicable), use the syringe to apply the grease to the grease fitting of each linear guide slider, located as follows:

- X axis linear guideway grease fitting — behind the sliding panel.
- Y axis linear guideway grease fitting — below the sliding panel.
- Z axis linear guideway grease fitting — behind the ball screw.

NOTE: There are no Z axis linear guideway fittings in R / RV Series units.



Control Assembly Cleaning

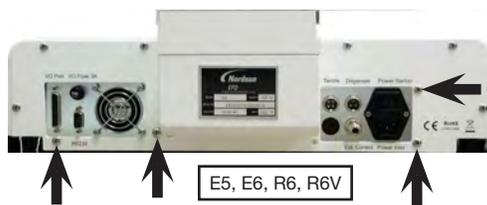
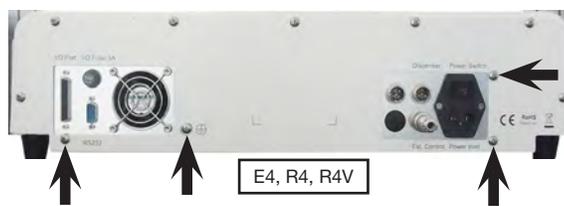
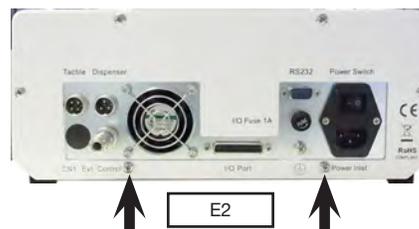
⚠ CAUTION

Risk of injury or equipment damage. Before performing any service procedure, complete the steps under “Preparation for all Service Procedures” on page 3.

Remove and Clean the Control Assembly

- 1 Remove the screws that secure the control assembly to the control assembly cover.

NOTE: The quantity and location of the screws that secure the control assembly to the control assembly cover differs for each robot model. See the images for the correct screws to remove for each model.



- 2 Carefully remove the control assembly by pulling it away from the front of the robot.



- 3 Use a clean brush and a nonwoven cloth to remove dust and other foreign materials from the control assembly.



- 4 Carefully slide the control assembly into the robot and then secure it to the control assembly cover with the screws removed previously.

Component Replacement

This section provides replacement procedures for the robot timing belt, motor, and fuse. These components do not have a replacement schedule and only require replacement in the unlikely event of damage or breakage.

Tools and Supplies

- 1 Cross-head screwdriver set
- 2 L-style hex wrench set
- 3 Torque wrench
- 4 Torque screwdriver
- 5 Needle-nose pliers (not shown)
- 6 Diagonal cutting pliers (not shown)
- 7 Belt tension meter (Nordson EFD recommends the Gates 508C Sonic Tension Meter)
- 8 Cable ties (not shown)
- 9 Needle-nose pliers or fine hemostat (for microfuse replacement)

(Not shown) Replacement parts as needed (refer to “Replacement Parts” on page 37 for part numbers).



Timing Belt Tension Adjustment

The X and Y axis timing belts require a specific tension, which is measured using a belt tension meter. The meter works by analyzing the harmonic characteristics of a vibrating belt. Use of the tension meter requires the input of the belt mass, belt width, and span length; these values are provided on page 15. Perform the following steps whenever you need to adjust the tension for a timing belt.

NOTE: This procedure is repeated where applicable in the component replacement procedures.

1. Enter the timing belt mass, width, and span (length) into the tension meter. Refer to “Timing Belt Mass, Width, and Span Data” on page 15 for these values.
2. Hold the meter 20 mm (0.8") from the timing belt, then strum the belt (as if it were a guitar string).
3. Observe the measurement displayed on the meter:
 - If the tension is within 50–70 N•m (37–52 ft-lb), the tension is correct
 - If the tension is outside 50–70 N•m (37–52 ft-lb), adjust the timing belt adjusting kit base screw and repeat the tension measurement. Repeat as needed until the tension measures 50–70 N•m (37–52 ft-lb).

NOTE: The tension meter displays measurements only as Newtons.

Timing Belt Tension Adjustment (continued)

Timing Belt Mass, Width, and Span Data

Model	X Axis			Y Axis		
	Mass (g/m)	Width (mm/R)	Span (mm)	Mass (g/m)	Width (mm/R)	Span (mm)
E2	1.3	9	289	1.3	9	289
E3	1.3	9	405	1.3	9	405
E4	1.3	9	502	1.3	9	502
E6	1.3	12	605	1.3	12	605
E6	1.3	12	722	1.3	12	605
R3 / R3V	1.3	9	405	1.3	9	405
R4 / R4V	1.3	9	502	1.3	9	502
R6 / R6V	1.3	12	722	1.3	12	605
PRO	1.3	12	533	1.3	12	514

Screw Torque Specifications

Refer to these torque specifications as needed.

Screw Type	Hex				Cross-Truss	
	M3	M4	M5	M6	M3	M4
Torque	3.9 N•m (40 kgf/cm) (34.5 in.-lb)	5.9 N•m (60 kgf/cm) (52.2 in.-lb)	7.8 N•m (80 kgf/cm) (69.0 in.-lb)	11.8 N•m (120 kgf/cm) (104.4 in.-lb)	1.2 N•m (12 kgf/cm) (10.6 in.-lb)	1.6 N•m (16 kgf/cm) (12.2 in.-lb)

Timing Belt and Motor Replacement: X Axis

CAUTION

Risk of injury or equipment damage. Before performing any service procedure, complete the steps under “Preparation for all Service Procedures” on page 3.

Remove the X and Z Axis Covers

- 1 Remove the X axis front cover. Refer to “Remove the X Axis Front Cover” on page 4 as needed for detailed instructions.



- 2
 - a. Remove the six (6) screws that secure the black X axis rear cover: three (3) on the top and three (3) on the bottom.
 - b. Remove the X axis rear cover by pulling in the Y direction away from the back of the robot.



- 3 Remove the Z axis cover. Refer to the following procedures as needed for detailed instructions:
 - “Remove the Z Axis Cover (All Units Except R / RV Series)” on page 8
 - “Remove the Z Axis Cover (R / RV Series Only)” on page 10

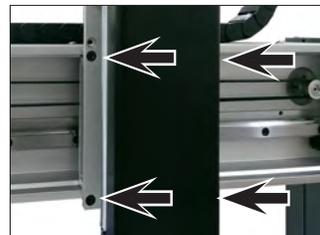


Replace the X Axis Timing Belt

- 4  CAUTION
Risk of equipment damage or personal injury. The Z axis module is heavy and will fall if not held. Nordson EFD recommends that the Z axis module be held by an assistant during disassembly.

Tightly grasp the Z axis module and then remove the four (4) screws on the left and right sides of the Z axis module that fasten it to the X axis linear guideway.

NOTE: Nordson EFD recommends that the Z axis module be held by an assistant; alternatively, you can carefully place the Z axis module on the top of the robot in a position that will not strain any connections.



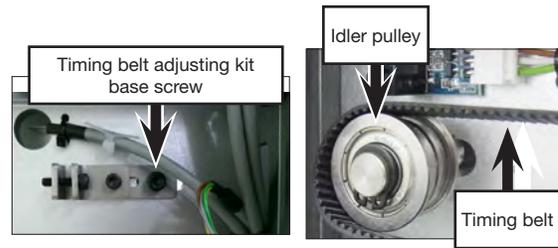
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Timing Belt and Motor Replacement: X Axis (continued)

Replace the X Axis Timing Belt (continued)

- 5 Release the timing belt adjusting kit base screw located on the rear of the X axis to loosen the timing belt from the idler pulley. This loosens the timing belt enough to remove it from the idler and timing pulleys.

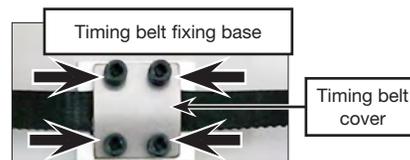
NOTE: The screw only needs to be loosened, not completely removed.



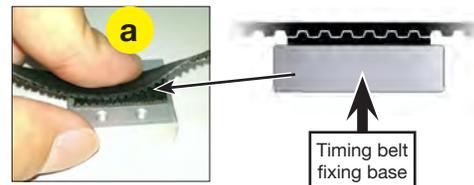
- 6 a. Remove the two (2) screws that fasten the timing belt fixing base and then detach the fixing base from the X axis linear guideway plate.
b. Move the timing belt and timing belt fixing base to a work space away from the robot.



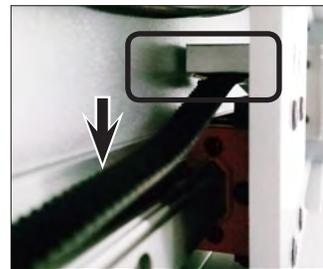
- 7 Remove the four (4) screws that fasten the timing belt cover to the timing belt fixing base and then remove the old timing belt from the assembly.



- 8 a. Match the sawtooth pattern of the new timing belt to the sawtooth pattern on the timing belt fixing base.
b. Secure the timing belt cover to the timing belt fixing base with the four (4) screws removed previously.



- 9 a. Move the timing belt and timing belt fixing base behind the X axis linear guideway plate. Ensure that:
- The sawtooth pattern on the insides of the timing belt loop are facing each other.
 - The timing belt cover faces the ground.
 - The section of the timing belt attached to the timing belt fixing base is the lower level of the belt.
- b. Place the timing belt around the idler and timing pulleys, then secure the timing belt fixing base to the X axis linear guideway plate with the two (2) screws removed previously.



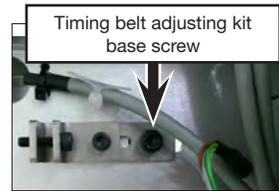
NOTE: The timing belt should be loose and drooping below the timing belt fixing base.

Continued on next page

Timing Belt and Motor Replacement: X Axis (continued)

Replace the X Axis Timing Belt (continued)

- 10 Tighten the timing belt adjusting kit base screw on the rear of the robot X axis to tighten the belt.



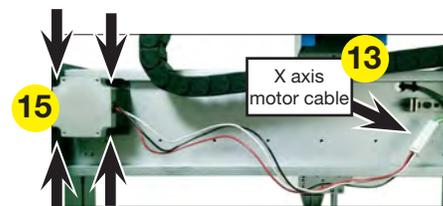
- 11 Measure the tension on the timing belt as follows:
- Move the X axis linear guideway plate to the left-most position.
 - Enter the timing belt mass, width, and span (length) into the tension meter. Refer to “Timing Belt Mass, Width, and Span Data” on page 15 for these values.
 - Hold the meter 20 mm (0.8”) from the timing belt, then strum the belt (as if it were a guitar string).
 - Observe the measurement displayed on the meter:
 - If the tension is within 50–70 N•m (37–52 ft-lb), the tension is correct
 - If the tension is outside 50–70 N•m (37–52 ft-lb), adjust the timing belt adjusting kit base screw again and repeat the tension measurement. Repeat as needed until the tension measures 50–70 N•m (37–52 ft-lb).



- 12 Secure the Z axis module to the X axis linear guideway plate with the four (4) screws removed previously.

Replace the X Axis Motor

- 13 On the rear side of the X axis, disconnect the X axis motor cable.
- 14 Release the X axis timing belt from the timing pulley attached to the X axis motor.
NOTE: For detailed instructions on releasing the timing belt, refer to “Replace the X Axis Timing Belt” on page 16.
- 15 Remove the four (4) screws that mount the X axis motor to the robot, then pull the motor away from the robot.

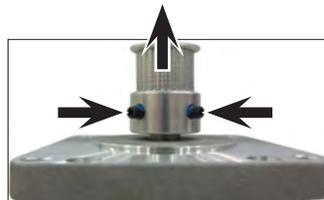


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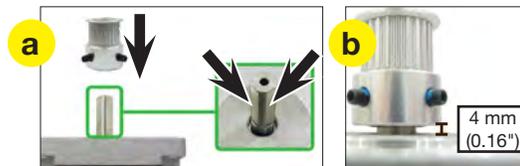
Timing Belt and Motor Replacement: X Axis (continued)

Replace the X Axis Motor (continued)

- 16 Remove the two (2) set screws on the timing pulley and then pull the timing pulley away from the motor.



- 17 a. Assemble the timing pulley onto the shaft of the new motor; align the timing pulley such that the two (2) set screws contact the two flat surfaces of the motor shaft.
b. Ensure that the distance from the base of the timing pulley to the top of the motor is 4 mm (0.16").



- 18 Place the new X axis motor into position and secure it with the four (4) screws removed previously.

- 19 Place the X axis timing belt around the timing pulley.

- 20 Measure the tension on the timing belt as follows:
- Move the X axis linear guideway plate to the left-most position.
 - Enter the timing belt mass, width, and span (length) into the tension meter. Refer to "Timing Belt Mass, Width, and Span Data" on page 15 for these values.
 - Hold the meter 20 mm (0.8") from the timing belt, then strum the belt (as if it were a guitar string).
 - Observe the measurement displayed on the meter:
 - If the tension is within 50–70 N•m (37–52 ft-lb), the tension is correct
 - If the tension is outside 50–70 N•m (37–52 ft-lb), adjust the timing belt adjusting kit base screw again and repeat the tension measurement. Repeat as needed until the tension measures 50–70 N•m (37–52 ft-lb).



Reinstall the X Axis Front Cover

- 21 Reinstall the X axis cover. Refer to "Reinstall the X Axis Front Cover" on page 5 for detailed instructions.

Timing Belt and Motor Replacement: Y Axis

⚠ CAUTION

Risk of injury or equipment damage. Before performing any service procedure, complete the steps under “Preparation for all Service Procedures” on page 3.

Remove the Y Axis, the Control Assembly, and the Control Assembly Cover

- 1 Remove the Y axis cover. Refer to “Remove the Y Axis Cover” on page 6 for detailed instructions. Return here to continue.

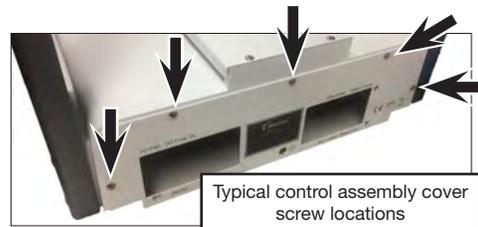


- 2 Remove the control assembly. Refer to the applicable steps under “Remove and Clean the Control Assembly” on page 13 to remove the control assembly. Return here to continue.



- 3 Remove all remaining screws on the back of the robot that secure the control assembly cover and then remove the cover to allow access to the Y axis motor.

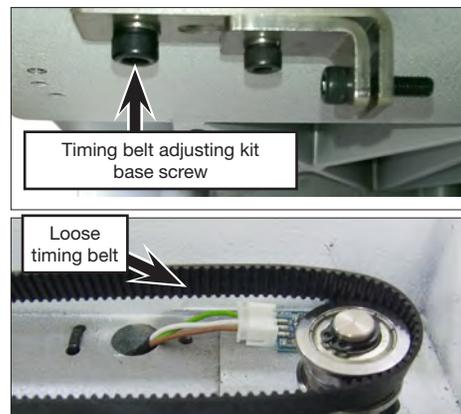
NOTE: The quantity and location of the screws that secure the control assembly cover differs for each robot model.



Replace the Y Axis Timing Belt

- 4 Release the timing belt adjusting kit base screw that sits in the front opening of the robot where the control assembly was previously installed. This loosens the timing belt enough to remove it from the idler and timing pulleys.

NOTE: The screw only needs to be loosened, not completely removed.



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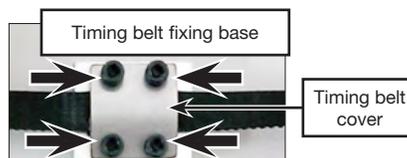
Timing Belt and Motor Replacement: Y Axis (continued)

Replace the Y Axis Timing Belt (continued)

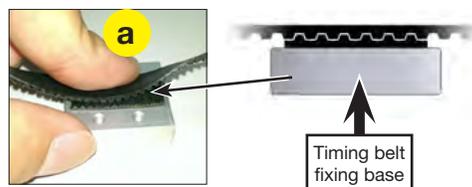
- 5 a. Remove two (2) screws that fasten the timing belt fixing base and then detach the fixing base from the Y axis linear guideway plate.
- b. Move the timing belt and timing belt fixing base to a work space away from the robot.



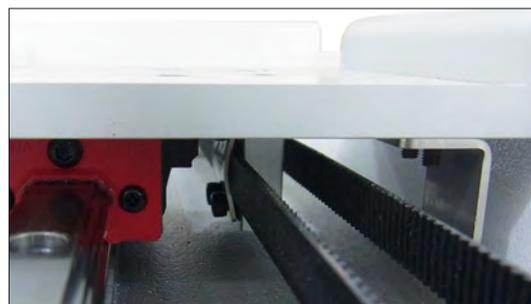
- 6 Remove the four (4) screws that fasten the timing belt cover to the timing belt fixing base and then remove the old timing belt from the assembly.



- 7 a. Match the sawtooth pattern of the new timing belt to the sawtooth pattern on the timing belt fixing base.
- b. Secure the timing belt cover to the timing belt fixing base with the four (4) screws removed previously.



- 8 a. Move the timing belt and timing belt fixing base assembly under the Y axis linear guideway plate. Ensure that:
- The timing belt fixing base is on the left side of the loop as viewed from the front of the robot.
 - The belt cover is the left-most part of the assembly, closest to the Y axis linear guideway.
- b. Place the timing belt around the idler and timing pulleys, then secure the timing belt fixing base to the Y axis linear guideway plate with the two (2) screws removed previously.



NOTE: The timing belt should still be loose.

- 9 To add tension to the belt, tighten the timing belt adjusting kit base screw that sits in the front opening of the robot where the control assembly was previously installed.

Continued on next page

Timing Belt and Motor Replacement: Y Axis (continued)

Replace the Y Axis Timing Belt (continued)

- 10 Measure the tension on the timing belt as follows:
 - a. Move the Y axis linear guideway plate to the rear-most position.
 - b. Enter the timing belt mass, width, and span (length) into the tension meter. Refer to “Timing Belt Mass, Width, and Span Data” on page 15 for these values.
 - c. Hold the meter 20 mm (0.8") from the timing belt, then strum the belt (as if it were a guitar string).
 - d. Observe the measurement displayed on the meter:
 - If the tension is within 50–70 N•m (37–52 ft-lb), the tension is correct
 - If the tension is outside 50–70 N•m (37–52 ft-lb), adjust the timing belt adjusting kit base screw again and repeat the tension measurement. Repeat as needed until the tension measures 50–70 N•m (37–52 ft-lb).

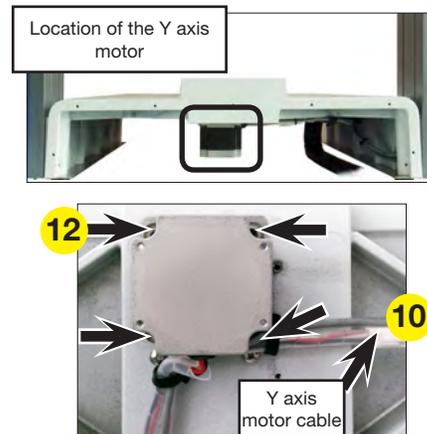


Replace the Y Axis Motor

- 11 Disconnect the Y axis motor cable.

NOTE: The Y axis motor is accessed from the rear opening of the robot where the control assembly was previously installed.
- 12 Release the Y axis timing belt from the timing pulley attached to the Y axis motor.

NOTE: For detailed instructions on releasing the timing belt, refer to “Replace the Y Axis Timing Belt” on page 20.
- 13 Remove the four (4) screws that mount the Y axis motor to the robot, then pull the motor away from the robot.

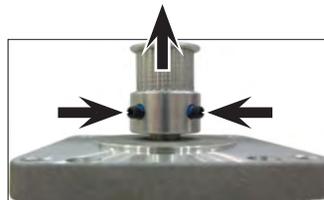


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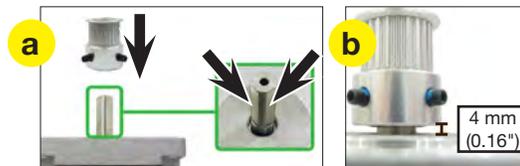
Timing Belt and Motor Replacement: Y Axis (continued)

Replace the Y Axis Motor (continued)

- 14 Remove the two (2) set screws on the timing pulley and then pull the timing pulley away from the motor.



- 15 a. Assemble the timing pulley onto the shaft of the new motor; align the timing pulley such that the two (2) set screws contact the two flat surfaces of the motor shaft.
b. Ensure that the distance from the base of the timing pulley to the top of the motor is 4 mm (0.16").



- 16 Place the new Y axis motor into position and secure it with the four (4) screws removed previously.

- 17 Place the Y axis timing belt around the timing pulley.

- 18 Repeat steps 9 and 10 of this procedure to measure the tension on the timing belt and observe the measurement displayed on the meter:
- If the tension is within 50–70 N•m (37–52 ft-lb), the tension is correct
 - If the tension is outside 50–70 N•m (37–52 ft-lb), adjust the timing belt adjusting kit base screw again and repeat the tension measurement. Repeat as needed until the tension measures 50–70 N•m (37–52 ft-lb).



Reinstall the Y Axis and Control Assembly Covers

- 19 Move the control assembly back into its position underneath the robot stage.

- 20 Place the control assembly cover on the back of the robot and secure it with the perimeter screws removed previously.

- 21 Secure the control assembly to the control assembly cover with the screws removed previously.

NOTE: The quantity and location of the screws that secure the control assembly to the control assembly cover differs for each robot model. Refer to “Control Assembly Cleaning” on page 13 for the control assembly cover screw locations.

- 22 Reinstall the Y axis cover. Refer to “Reinstall the Y Axis Cover” on page 7 for detailed instructions.

- 23 Place the fixture plate on the Y axis linear guideway plate and secure it with the four (4) screws removed previously.

Timing Belt and Motor Replacement: Z Axis

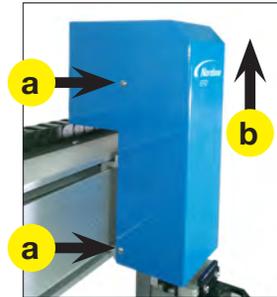
NOTE: This procedure does not apply to R / RV Series units.

⚠ CAUTION

Risk of injury or equipment damage. Before performing any service procedure, complete the steps under "Preparation for all Service Procedures" on page 3.

Remove the Z Axis Cover

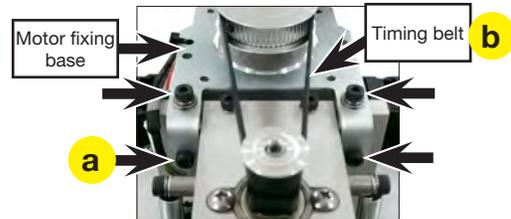
- 1
 - a. Remove the four (4) screws that secure the Z axis cover to the Z axis module.
 - b. Pull up vertically to remove the Z axis cover.



Replace the Z Axis Timing Belt (All Units Except E2 / E2V and R / RV Series)

- 2
 - a. Release the four (4) screws on the motor fixing base. This loosens the timing belt enough to remove it from the idler and timing pulleys.

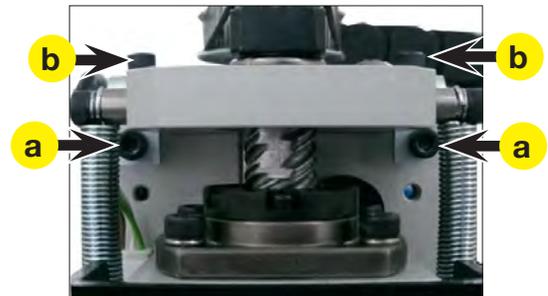
NOTE: The screw only needs to be loosened, not completely removed.
 - b. Remove the old timing belt from the idler and timing pulleys.



- 3 With the sawtooth sides of the new timing belt facing one another, loop the belt around the idler and timing pulleys.

- 4 Secure the motor fixing base to the Z axis module as follows:
 - a. Tighten the two (2) horizontal screws to secure the timing belt.
 - b. Tighten the two (2) vertical screws to secure the motor fixing base to the Z axis module.

NOTE: The tension is not measured for this belt.

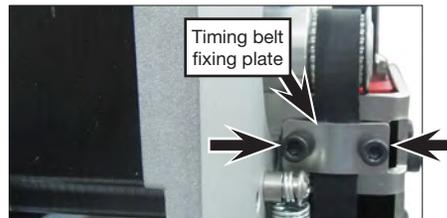


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Timing Belt and Motor Replacement: Z Axis (continued)

Replace the Z Axis Timing Belt (E2 / E2V units only)

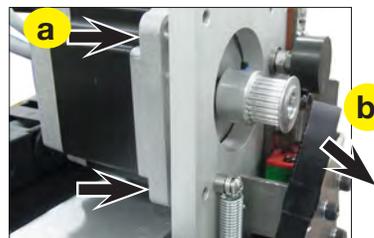
- 5 Release the two (2) screws that fasten the timing belt fixing plate and then remove the plate.



- 6 a. Release the four (4) screws that fasten the motor to the robot. This loosens the timing belt enough to remove it from the idler and timing pulleys.

NOTE: The screw only needs to be loosened, not completely removed.

- b. Remove the old timing belt from the idler and timing pulley.



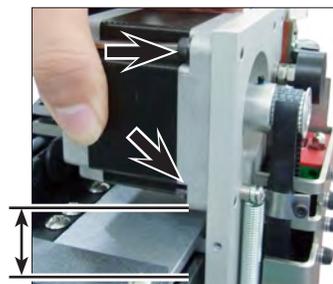
- 7 With the sawtooth sides of the new timing belt facing one another, loop the belt around the idler and timing pulleys.

Align the sawtooth pattern of the timing belt so it matches the pattern on the Z axis module that is covered by the timing belt fixing plate.



- 8 Adjust the motor to the upright position and tighten the four (4) screws that fasten the motor to the robot.

NOTE: The tension is not measured for this belt.



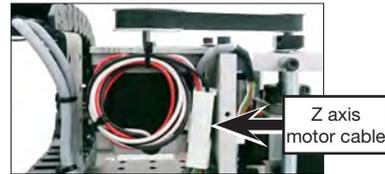
- 9 Secure the timing belt fixing plate with the two (2) screws removed previously.

Continued on next page

Timing Belt and Motor Replacement: Z Axis (continued)

Replace the Z Axis Motor (All Units Except E2 / E2V and R / RV Series)

- 10 Disconnect the Z axis motor cable.



- 11 Release the four (4) screws on the motor fixing base.

This loosens the motor enough to remove the timing belt from the timing pulley, at which point the motor fixing base and timing pulley can be completely removed from the Z axis module.

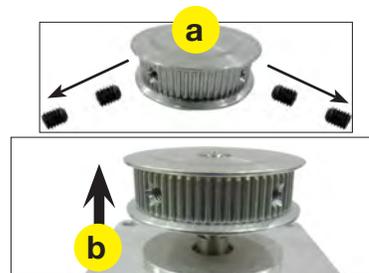
- 12 Release the four (4) screws fastening the Z axis motor to the motor fixing base and then place the isolated motor on the work bench.



- 13 a. Release the four (4) set screws located inside the threaded holes of the timing pulley.

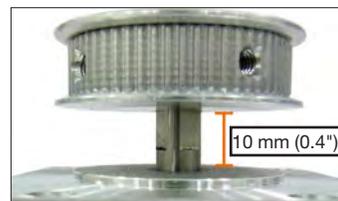
NOTE: Two set screws are used in each hole: one screw for initial contact with the shaft and a second screw to secure the position.

- b. Lift the timing pulley off the Z axis motor shaft.



- 14 a. Assemble the timing pulley onto the new Z axis motor shaft; position the timing pulley such that the two (2) set screw holes align with the two flat surfaces of the motor shaft.

- b. Ensure that the distance from the base of the timing pulley to the top of the motor is 10 mm (0.4").

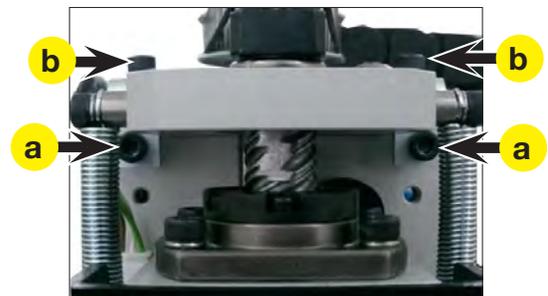


- 15 Secure the new Z axis motor and the timing pulley to the motor fixing base with the four (4) screws removed previously.

- 16 Secure the motor fixing base to the Z axis module as follows:

- a. Tighten the two (2) horizontal screws to secure the timing belt.
b. Tighten the two (2) vertical screws to secure the motor fixing base to the Z axis module.

NOTE: The tension is not measured for this belt.

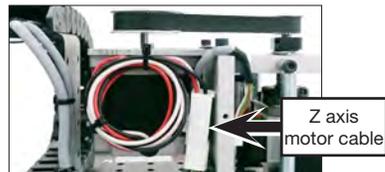


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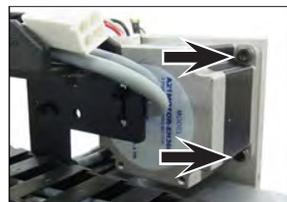
Timing Belt and Motor Replacement: Z Axis (continued)

Replace the Z Axis Motor (E2 / E2V Units Only)

- 17 Disconnect the Z axis motor cable.



- 18 Release the four (4) screws that fasten the motor to the Z axis module.
This loosens the motor enough to remove the timing belt from the timing pulley, at which point the motor can be completely removed from the robot.



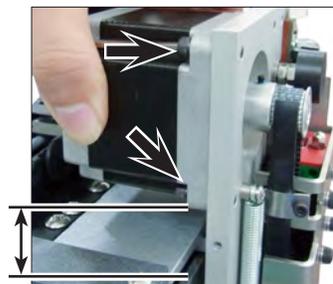
- 19 Remove the two (2) set screws on the timing pulley and then pull the timing pulley away from the motor.

- 20 a. Assemble the timing pulley onto the shaft of the new motor; align the timing pulley such that the two (2) set screws contact the two flat surfaces of the motor shaft.
b. Ensure that the distance from the base of the timing pulley to the top of the motor is 3.5 mm (0.14").



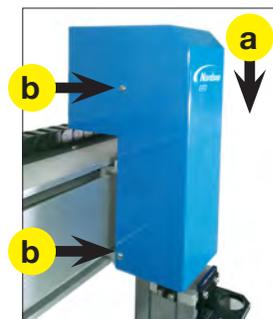
- 21 Adjust the motor to the upright position and tighten the four (4) screws that fasten the motor to the Z axis module.

NOTE: The tension is not measured for this belt.



Reinstall the Z Axis Cover

22. a. Reinstall the Z axis cover.
b. Secure the cover with the screws removed previously.



Timing Belt and Motor Replacement: R / RV Series Z and R Axes

NOTE: This procedure applies only to R / RV Series units.

⚠ CAUTION

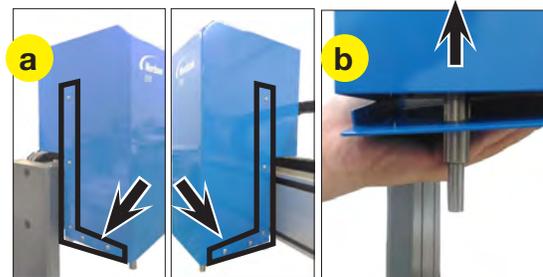
Risk of injury or equipment damage. Before performing any service procedure, complete the steps under "Preparation for all Service Procedures" on page 3.

Remove the Z Axis Cover (R / RV Series Only)

- 1 a. Remove the 10 screws that secure the Z axis cover to the Z axis module.
- b. Carefully pull up vertically to remove the Z axis cover.

NOTE: Removing the four (4) screws near the bottom of the Z axis cover releases the Z axis bottom plate; place your hand underneath the plate to catch it.

NOTE: The Z axis module can be in any position along the X axis during maintenance.

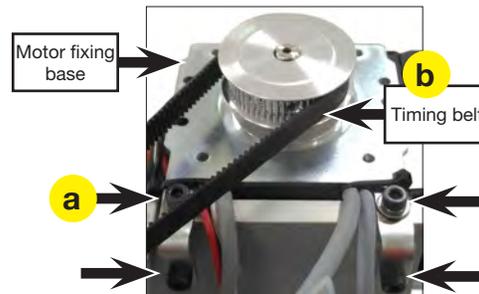


Replace the Z Axis Timing Belt (R / RV Series Only)

- 2 a. Release the four (4) screws on the motor fixing base. This loosens the timing belt enough to remove it from the idler and timing pulleys.

NOTE: The screws only need to be loosened, not completely removed.

- b. Remove the old timing belt from the idler and timing pulley.

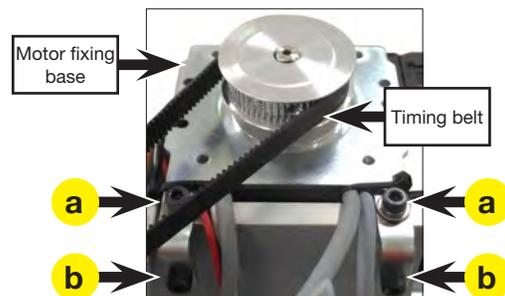


- 3 With the sawtooth sides of the new timing belt facing one another, loop the belt around the idler and timing pulleys.



- 4 Secure the motor fixing base to the Z axis module as follows:
 - a. Tighten the two (2) horizontal screws to secure the timing belt.
 - b. Tighten the two (2) vertical screws to secure the motor fixing base to the Z axis module.

NOTE: The tension is not measured for this belt.



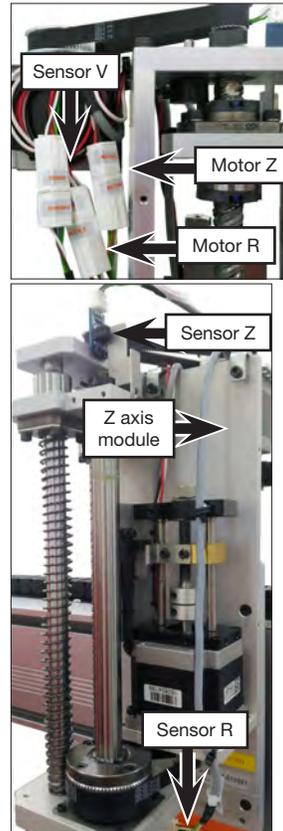
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Timing Belt and Motor Replacement: Z and R Axes (continued)

Replace the R Axis Timing Belt (R / RV Series Only)

- 5 Disconnect the following cables:
- Motor Z
 - Motor R
 - Sensor V (R axis reversal optical switch)
 - Sensor R
 - Sensor Z

NOTE: All sensors must be disconnected to allow sufficient movement of the Z axis module in future steps.



6 **CAUTION**

Risk of equipment damage or personal injury. The Z axis module is heavy and will fall if not held. A second technician should hold the Z axis module during disassembly.

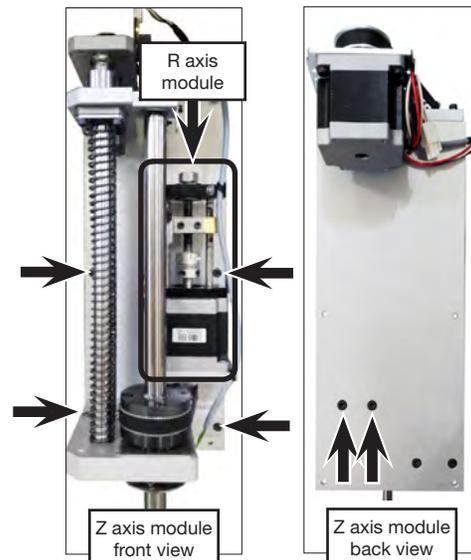
Release the four (4) screws that fasten the Z axis module to the robot assembly.

NOTE: If the wires for Sensor R, Sensor V, and Motor R are connected to the Z axis module, the mobility of the module will be limited and the following steps will have to be performed with the module near the robot.

- 7 Tightly grasp the R axis module and then release the two (2) screws on the back side of the Z axis module to release the R axis module.

NOTES:

- Releasing the R axis module provides enough mobility so the R axis timing belt can be removed from the pulley on the R axis motor.
- The R axis timing belt will be free but constrained around the R axis ball spline.

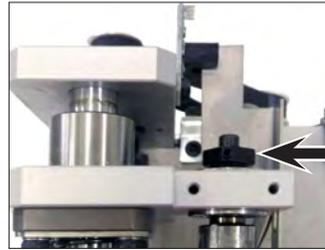


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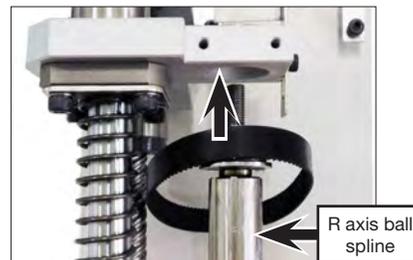
Timing Belt and Motor Replacement: Z and R Axes (continued)

Replace the R Axis Timing Belt (R / RV Series Only) (continued)

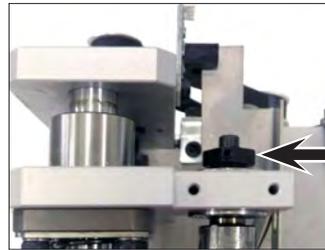
- 8 Use a 12 mm wrench to release the black block set bolt and then remove the black block from the threaded section of the R axis ball spline.



- 9 Move the R axis ball spline down and then remove the old timing belt.



- 10 a. Slip the new timing belt around the R axis ball spline.
b. Move the ball spline back into position and then tighten the black block set bolt to secure it.



- 11 With the sawtooth sides of the new timing belt facing one another, loop the belt around the R axis idler and timing pulleys.

NOTE: The tension is not measured for this belt.

- 12 Secure the R axis module to the Z axis module with the two (2) screws removed previously.

- 13 Secure the Z axis module to the robot with the four (4) screws previously removed.

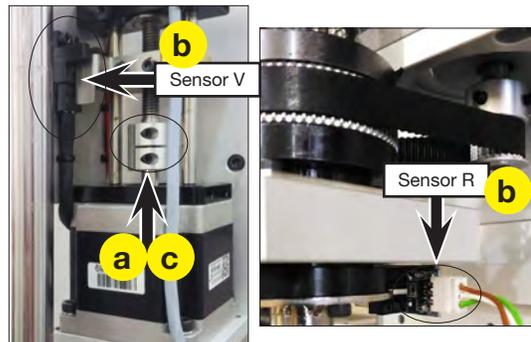
- 14 Reconnect the Motor Z, Motor R, Sensor V (R axis Reversal Optical Switch), Sensor R, and Sensor Z cables.
-

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Timing Belt and Motor Replacement: Z and R Axes (continued)

Replace the R Axis Timing Belt (R / RV Series Only) (continued)

- 15
 - a. After the timing belt is fastened and all cables are reconnected, release the two (2) screws that attach the R axis ball screw and the R axis motor shaft.
 - b. Power on the robot and adjust Sensor V and Sensor R until their sensor lights are blocked simultaneously.
 - c. In that position, re-tighten the two (2) screws that secure the R axis ball screw and the R axis motor shaft.



- 16 Switch off the robot power before continuing to the next procedure.

Replace the Z Axis Motor (R / RV Series Only)

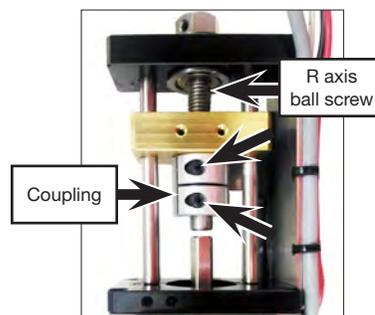
- 17 Go to “Replace the Z Axis Motor (All Units Except E2 / E2V and R / RV Series)” on page 26 to replace the Z axis motor. Return here to continue.

NOTE: The only difference for the R / RV series is that the timing belt is angled as it exits the timing pulley; this does not alter the motor replacement process.

Replace the R Axis Motor (R / RV Series Only)

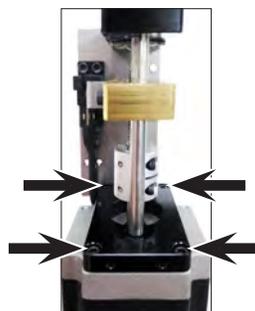
- 18 Complete steps 5–7 of “Replace the R Axis Timing Belt (R / RV Series Only)” on page 29 to release the R axis module. Return here to continue.

- 19 Release the two (2) screws that attach the R axis ball screw and the R axis motor shaft and push the coupling up.



- 20 Release the four (4) screws that fasten the R axis motor to the R axis module.

NOTE: The ball screw is part of the R axis module.



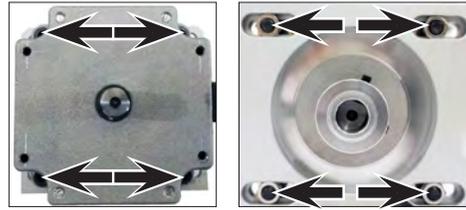
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Timing Belt and Motor Replacement: Z and R Axes (continued)

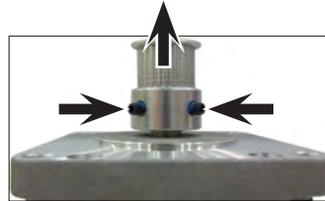
Replace the R Axis Motor (R / RV Series Only)

- 21 Release the four (4) screws that fasten the R axis motor to the R axis motor base plate.

NOTE: The screws are threaded into nuts located underneath the R axis motor base plate; these nuts will fall when the screws are released.



- 22 Remove the two (2) set screws on the timing pulley and then pull the timing pulley away from the motor.



- 23 Assemble the timing pulley onto the shaft of the new motor; align the timing pulley such that the two (2) set screws contact the two flat surfaces of the motor shaft.

Ensure that the distance from the base of the timing pulley to the top of the motor is 6 mm (0.24").



- 24 Secure the new R axis motor and timing pulley to the R axis motor base plate with the four (4) screws and nuts removed previously.

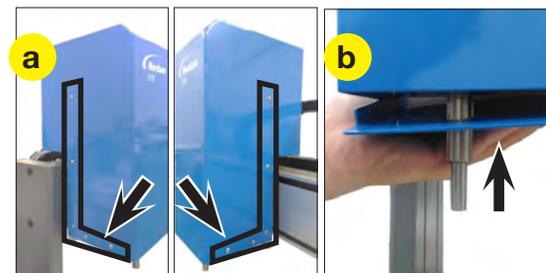
- 25 Secure the R axis motor to the R axis module with the four (4) screws removed previously.

- 26 Complete steps 11–15 of “Replace the R Axis Timing Belt (R / RV Series Only)” on page 29 to complete the maintenance process. Return here to continue.

NOTE: The only exception is that in step 15, the R axis ball screw and motor shaft will already be detached.

Reinstall the Z Axis Cover (R / RV Series Only)

- 27 a. Position the Z axis cover over the Z axis module and vertically lower it to its correct orientation.
b. Lift up the Z axis bottom plate and secure the two components with the 10 screws removed previously.

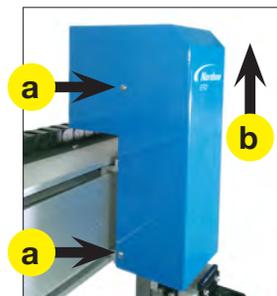


Z Axis Spring Replacement (E and EV Series Only)

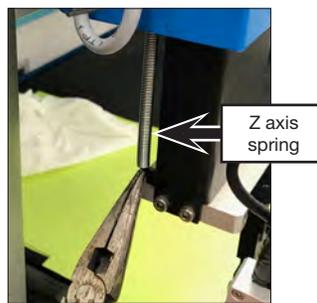
⚠ CAUTION

Risk of injury or equipment damage. Before performing any service procedure, complete the steps under “Preparation for all Service Procedures” on page 3.

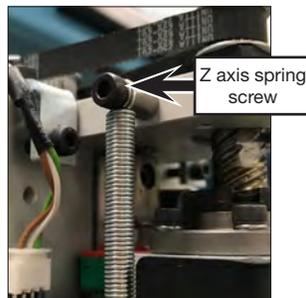
- 1
 - a. Remove the four (4) screws that secure the Z axis cover to the Z axis module.
 - b. Pull up vertically to remove the Z axis cover.



- 2
 - While keeping the Z axis head in the top position, grasp the bottom of the Z axis spring and then pull it down and push it towards the back of the robot to release it from the retaining lip.

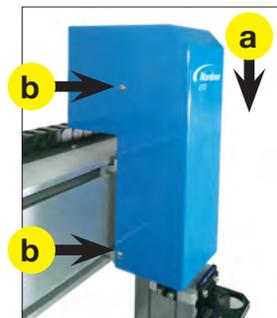


- 3
 - Remove the screw that secures the Z axis spring; this frees the spring.



- 4
 - Secure the replacement Z axis spring with the screw removed previously.
- 5
 - Grasp the bottom of the Z axis spring and then pull it down and place the bottom loop inside the retaining lip.

- 6
 - a. Reinstall the Z axis cover.
 - b. Secure the cover with the screws removed previously.



Fuse Replacement

CAUTION

Risk of injury or equipment damage. Before performing any service procedure, complete the steps under “Preparation for all Service Procedures” on page 3.

Fuse Replacement (P/N 7361392 – All Units Except E2) (P/N 7361391 – E2 Units)

- 1 Unscrew the robot fuse holder (P/N 7361394) and remove the fuse.
NOTE: The fuse is located on the left side of the control assembly cover on all models except E2 units. On E2 units, the fuse is located on the right side of the control assembly cover.



- 2 Visually inspect the fuse for a broken wire or a scorched cylinder that is brown or black in color; these are signs of a blown fuse.
NOTE: You can also use a multimeter to check the fuse: With the multimeter in resistance mode, touch the metal tips of the testing leads to the metal ends of the fuse. If the resistance displayed does not change (thus remaining at a 100% resistance state), then the fuse is blown. If a small resistance is measured, then the fuse is good.

- 3 **(All units except E2)**

If the fuse is blown, remove it from the robot fuse holder install a new 20 mm, 3 A fuse (P/N 7361392).

(E2 units only)

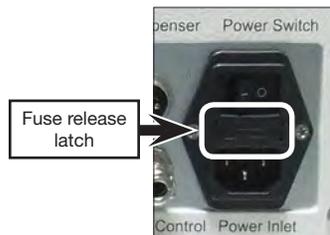
If the fuse is blown, remove it from the robot fuse holder install a new 20 mm, 1 A fuse (P/N 7361391).

- 4 Reinstall the robot fuse holder in the robot.

Fuse Replacement (continued)

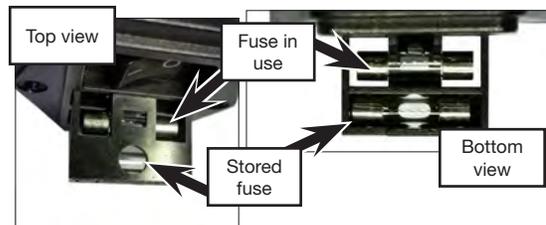
Fuse Replacement (P/N 7361393 – All Units Except E2)

- 1 Open the fuse release latch located between the Power Switch and the Power Inlet. The latch has a fuse symbol on it.



- 2 Pull open the spare-fuse holder.

NOTE: The spare-fuse holder includes two fuses. The fuse closest to the exterior face is in storage and the far side fuse is in use.



- 3 Visually inspect the fuse for a broken wire or a scorched cylinder that is brown or black in color; these are signs of a blown fuse.

NOTE: You can also use a multimeter to check the fuse: With the multimeter in resistance mode, touch the metal tips of the testing leads to the metal ends of the fuse. If the resistance displayed does not change (thus remaining at a 100% resistance state), then the fuse is blown. If a small resistance is measured, then the fuse is good.

- 4 Remove the blown fuse from the spare fuse holder and install a new fuse.
- 5 Reinstall the spare fuse holder with the new fuse in the power socket.

I/O Microfuse Replacement

- 1 Remove the control assembly. Refer to the applicable steps under “Remove and Clean the Control Assembly” on page 13 to remove the control assembly. Return here to continue.

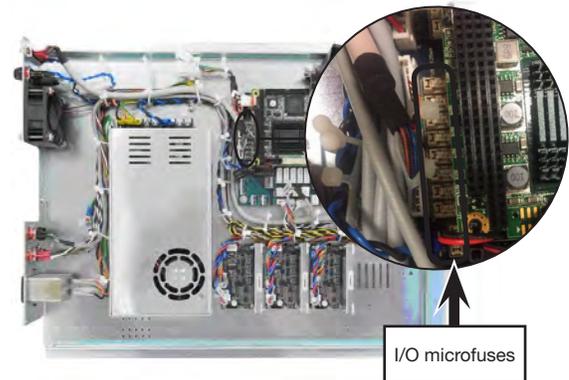


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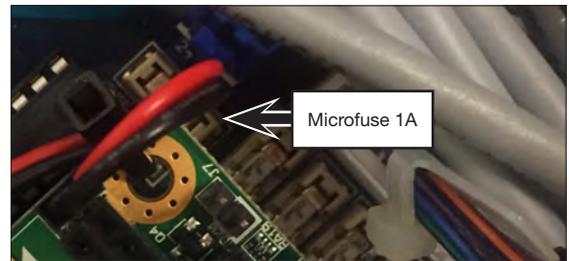
Fuse Replacement (continued)

I/O Microfuse Replacement (continued)

- 2 Locate the microfuses on printed circuit board B. The microfuses are very small.



- 3 Use a multimeter to check microfuse 1A (the main output microfuse): With the multimeter in resistance mode, touch the metal tips of the testing leads to the metal ends of the microfuse. If the resistance displayed does not change (thus remaining at a 100% resistance state), then the microfuse is blown. If a small resistance is measured, then the microfuse is good.



- 4 **CAUTION**
Avoid pinching or grasping the small tabs that hold the microfuse; doing so can permanently damage the microfuse holder.

If the microfuse is blown, use needle-nose pliers or a fine hemostat to remove the microfuse and to reinstall a replacement microfuse.



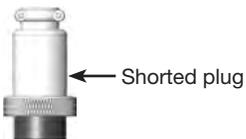
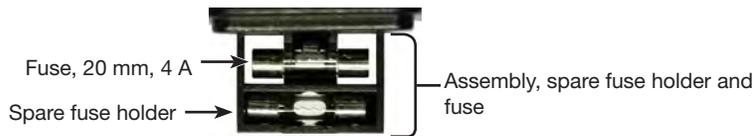
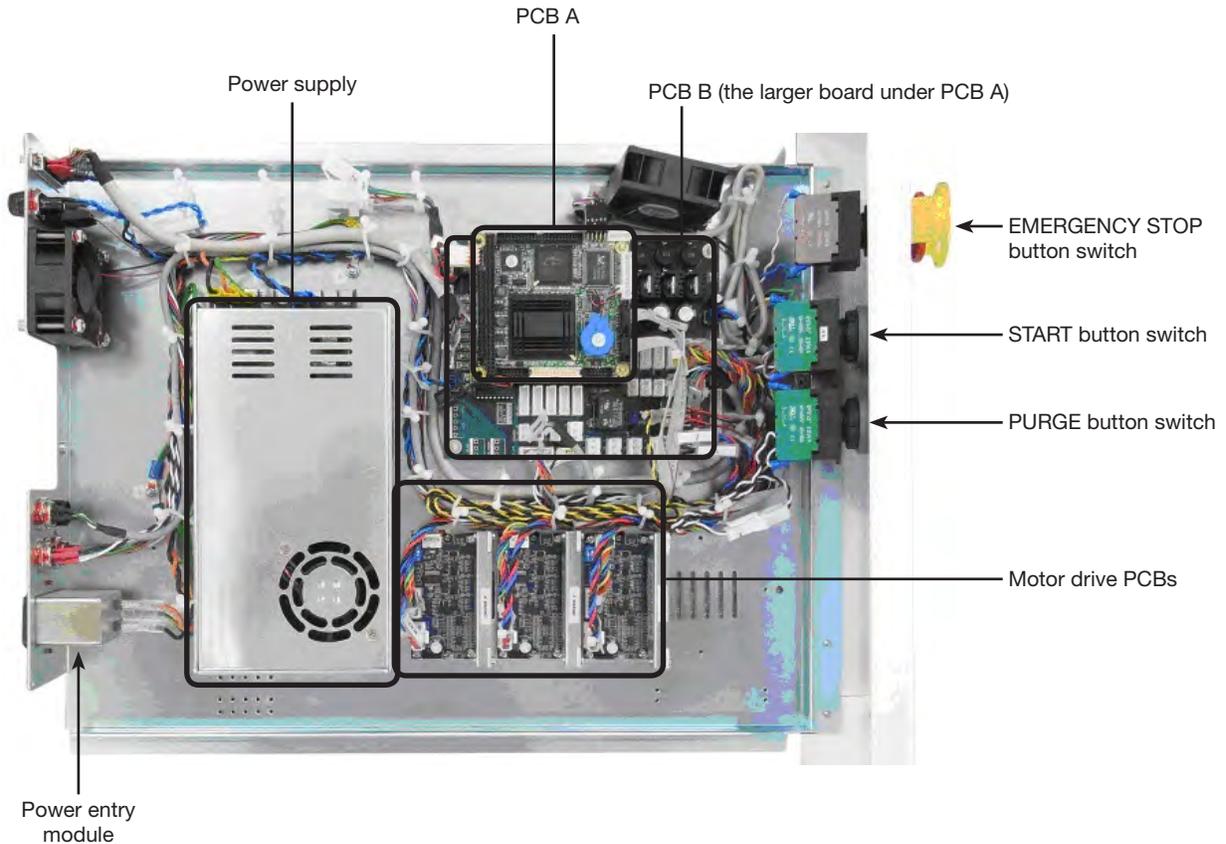
- 5 Visually inspect the other microfuses for a broken wire or a scorched cylinder that is brown or black in color; these are signs of a blown microfuse.
NOTE: You can also use a multimeter to check the microfuses (same instructions as in step 3).

- 6 **CAUTION**
Avoid pinching or grasping the small tabs that hold the microfuse; doing so can permanently damage the microfuse holder.

If a microfuse is blown, use needle-nose pliers or a fine hemostat to remove the microfuse and to reinstall a replacement microfuse.

Replacement Parts

- Most replacement parts are grouped into hardware kits by robot model. Refer to “Hardware Kits” on page 38.
- The printed circuit boards (PCBs) are applicable to all models and are available in a standalone kit. Refer to “Printed Circuit Board (PCB) Kit” on page 39.
- Other available kits are specific to each robot model. Refer to “Model-Specific Kits” on page 39.



Replacement Parts (continued)

Hardware Kits

Hardware kits vary depending on the robot model and include replacement parts that correspond to the procedures in this manual.

Hardware Kit Part Numbers

Part #	Model
7363278	PRO

Part #	Model
7363279	E2 / E2V
7363280	E3 / E3V
7363281	E4 / E4V
7363282	E5 / E5V
7363283	E6 / E6V

Part #	Model
7363275	R3 / R3V
7363276	R4 / R4V
7363277	R6 / R6V

Hardware Kit Contents

Component Group	Included in the Hardware Kit for these Models			
	PRO	E2 / E2V Only	E3-E6 / E3-E6V (Not E2 / E2V)	R / RV
Mechanical				
Hardware kit (screws for a pencil or CCD camera)	X	X	X	
Belt kit	X	X	X	X
Grease kit	X	X	X	X
Motor, Z axis	X	X	X	X
Motor, Y axis	X	X	X	X
Motor, X axis	X	X	X	X
Motor, R axis				X
Spring, standard		X	X	
Spring, 6 kg			X	
Electrical Switches				
START button switch	X	X	X	X
EMERGENCY STOP button switch	X	X	X	X
PURGE button switch	X	X	X	X
Optical switch	X	X	X	X
Electrical Control				
Power supply, 24V, 320W	X	X	X	X
Power entry module	X	X	X	X
Motor drive PCBs	X	X	X	X
Shorted plug	X	X	X	X
Fuses				
Microfuse, I/O, 125 mA	X	X	X	X
Fuse, 20 mm, 1 A		X		
Fuse, 20 mm, 3 A	X		X	X
Fuse, 20 mm, 4 A	X	X	X	X
Fuse holder	X	X	X	X
Model-Specific				
CCD camera cable	X			
Replacement camera lens	X			

Replacement Parts (continued)

Printed Circuit Board (PCB) Kit

This kit includes PCBs A and B and applies to all robot models. To replace the PCBs, contact Nordson EFD for technical assistance.

Part #	Description	Item
7363284	Service kit, printed circuit boards (PCBs) A and B	

Model-Specific Kits

The following replacement parts are specific to each robot model. When replacing these components, contact Nordson EFD for technical assistance as needed.

PRO Series

Part #	Description	Item
7362443	DispenseMotion™ controller, PRO Series	
7362438	Base bracket for valve mounting, PRO Series	
7362424	CCD camera	
7362439	Replacement bulb, CCD camera, white	
7362440	Replacement bulb, CCD camera, red	
7362441	Replacement bulb, CCD camera, blue	
7362442	Light controller	

Replacement Parts (continued)

EV Series

Part #	Description	Item
7361382	DispenseMotion controller, EV Series (and RV Series)	
7361383	Pencil (simple vision) camera	

R / RV Series

Part #	Description	Item
7361382	DispenseMotion controller, EV Series (and RV Series)	
7362424	CCD camera	
7361668	Base bracket for valve mounting, R / RV Series	

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