

4-Axis PROPlus Automated Dispensing System

Operating Manual Supplement



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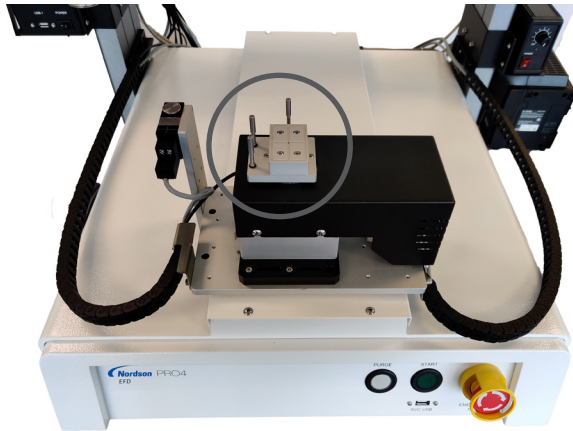
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Introduction

The 4-Axis PROPlus automated dispensing system includes a rotating table that allows full 360-degree rotation of a workpiece, thus adding a fourth axis to the robot. The information that is unique to this robot configuration is contained in this supplement. All other information for this system, including safety, installation, programming, operation, troubleshooting, and technical data is contained in the **PROPlus / PRO Series Automated Dispensing Systems Operating Manual**.

Applicability of this Supplement

This supplement includes only the information specific to a 4-Axis PROPlus automated dispensing system, which includes a rotating table. For all other information pertaining to PROPlus automated dispensing systems, including all DispenseMotion programming procedures, refer to the **PROPlus / PRO Series Automated Dispensing Systems Operating Manual** (hereafter referred to as the **PROPlus / PRO Series Operating Manual**).



The rotating table adds a fourth axis to a PROPlus robot

Specifications

NOTE: Specifications and technical details are subject to change without prior notification.

Item	Specification
Number of axes	4
Maximum working area (X / Y / Z / R*)	350 / 400 / 100 mm / $\pm 1080^\circ$ (14 / 16 / 4" / $\pm 1080^\circ$)
Workpiece payload (Y axis without the rotating table)	22.0 kg (48.5 lb)
Workpiece payload (R*)	2.0 kg (4.4 lb)
Tool payload (Z)	6.0 kg (13.2 lb)
Weight	75 kg (165.3 lb)
Dimensions	Refer to "Robot Dimensions" on page 18.
Maximum speed** (XY)	800 mm/s (31"/s)
Maximum speed** (Z)	250 mm/s (10"/s)
Maximum speed** (R*)	1080°/s
Drive system	Closed-loop stepper motor and driver package with absolute sensor
Drive system (R*)	5-phase micro-stepping motor
Memory capacity	PC storage
Data storage	PC storage / USB
General purpose I/O	8 inputs / 8 outputs (16 / 16 optional)
Drive method	PTP and CP
Dispensing controller	External
Input AC (to power supply)	100–240 VAC ($\pm 10\%$), 50/60 Hz, 20 A maximum, 380 W
Input air pressure (for rotating table)	0–1 mPa (0–145 psi)
Interpolation	4 axes (4D space)
Repeatability*** (XY / Z)	± 0.003 mm/axis
Repeatability*** (R*)	$\pm 0.005^\circ$
Operating temperature	10–40° C (50–104° F)
Closed-loop X and Y axis encoder	Included
Tip detection	Included
Vision	CCD smart camera
DispenseMotion software	Included
Laser height detection	Optional
Approvals	CE, UKCA, RoHS, WEEE, China RoHS
*R = rotating table	
**Actual travel speed depends on the dispensing path and workpiece / tool payloads.	
***Repeatability results may vary depending on the method of measurement.	

Specifications (continued)

RoHS标准相关声明 (China RoHS Hazardous Material Declaration)

产品名称 Part Name	有害物质及元素 Toxic or Hazardous Substances and Elements					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr6)	多溴联苯 Polybrominated Biphenyls (PBB)	多溴联苯醚 Polybrominated Diphenyl Ethers (PBDE)
外部接口 External Electrical Connectors	X	0	0	0	0	0
<p>0: 表示该产品所含有的危险成分或有害物质含量依照EIP-A, EIP-B, EIP-C的标准低于SJ/T11363-2006 限定要求。 Indicates that this toxic or hazardous substance contained in all the homogeneous materials for this part, according to EIP-A, EIP-B, EIP-C is below the limit requirement in SJ/T11363-2006.</p> <p>X: 表示该产品所含有的危险成分或有害物质含量依照EIP-A, EIP-B, EIP-C的标准高于SJ/T11363-2006 限定要求。 Indicates that this toxic or hazardous substance contained in all the homogeneous materials for this part, according to EIP-A, EIP-B, EIP-C is above the limit requirement in SJ/T11363-2006.</p>						

WEEE Directive

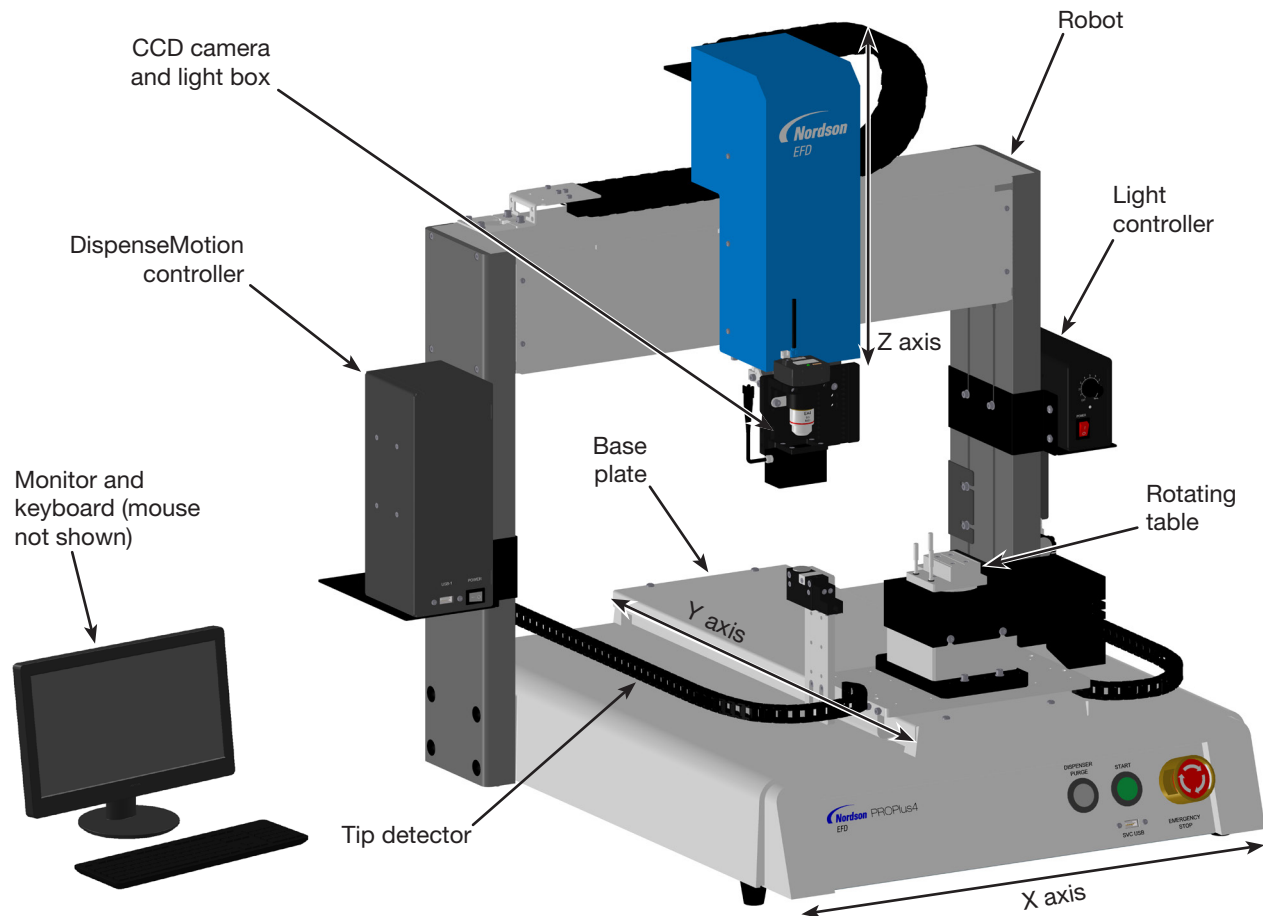


This equipment is regulated by the European Union under WEEE Directive (2012/19/EU). Refer to www.nordsonefd.com/WEEE for information about how to properly dispose of this equipment.

Operating Features

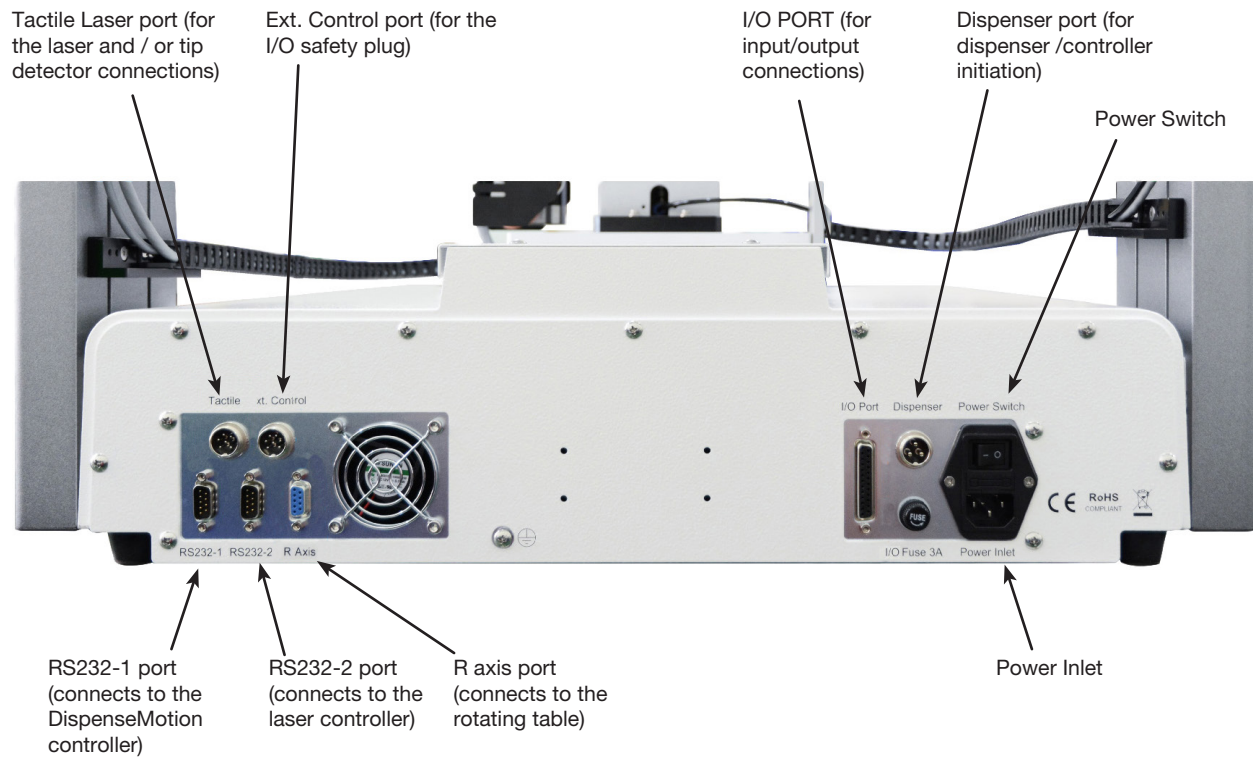
NOTE: This section includes only the information unique to a 4-Axis PROPlus robot. For complete system information, refer to the **PROPlus / PRO Series Operating Manual**.

4-Axis PROPlus System Component Identification



Operating Features (continued)

4-Axis PROPlus Back Panel



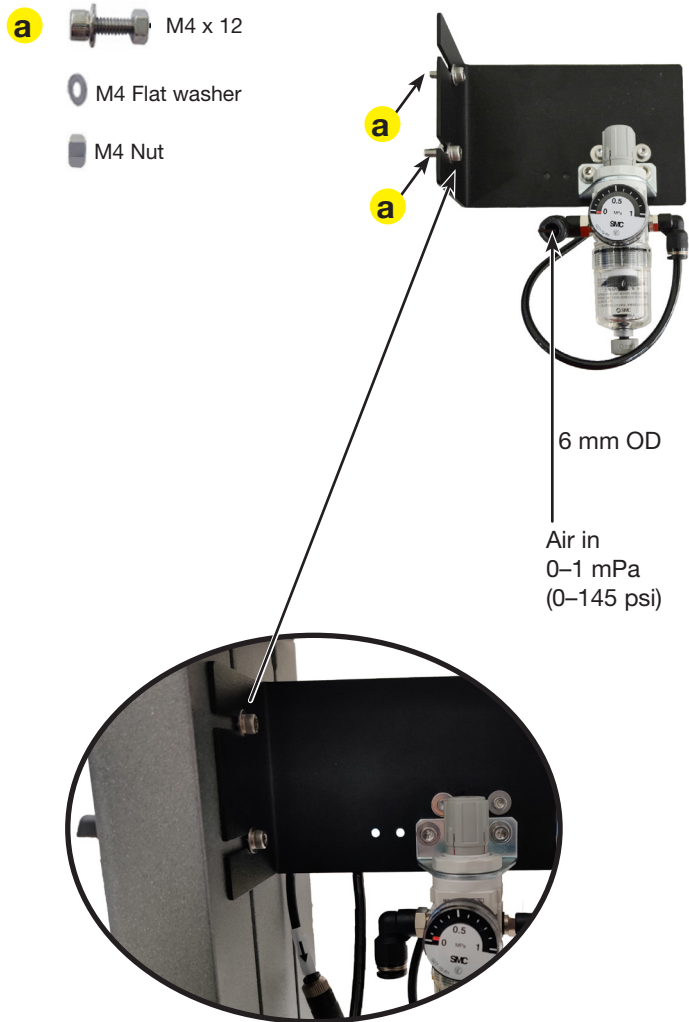
Install and Connect Components for a 4-Axis PROPlus System

Install and connect 4-Axis PROPlus system-specific components as shown in this section. The rotating table is pre-installed.

NOTE: This section includes only the information unique to a 4-Axis PROPlus robot. For complete system information, refer to the **PROPlus / PRO Series Quick Start Guide** and the **PROPlus / PRO Series Operating Manual**.

Install the Air Pressure Regulator

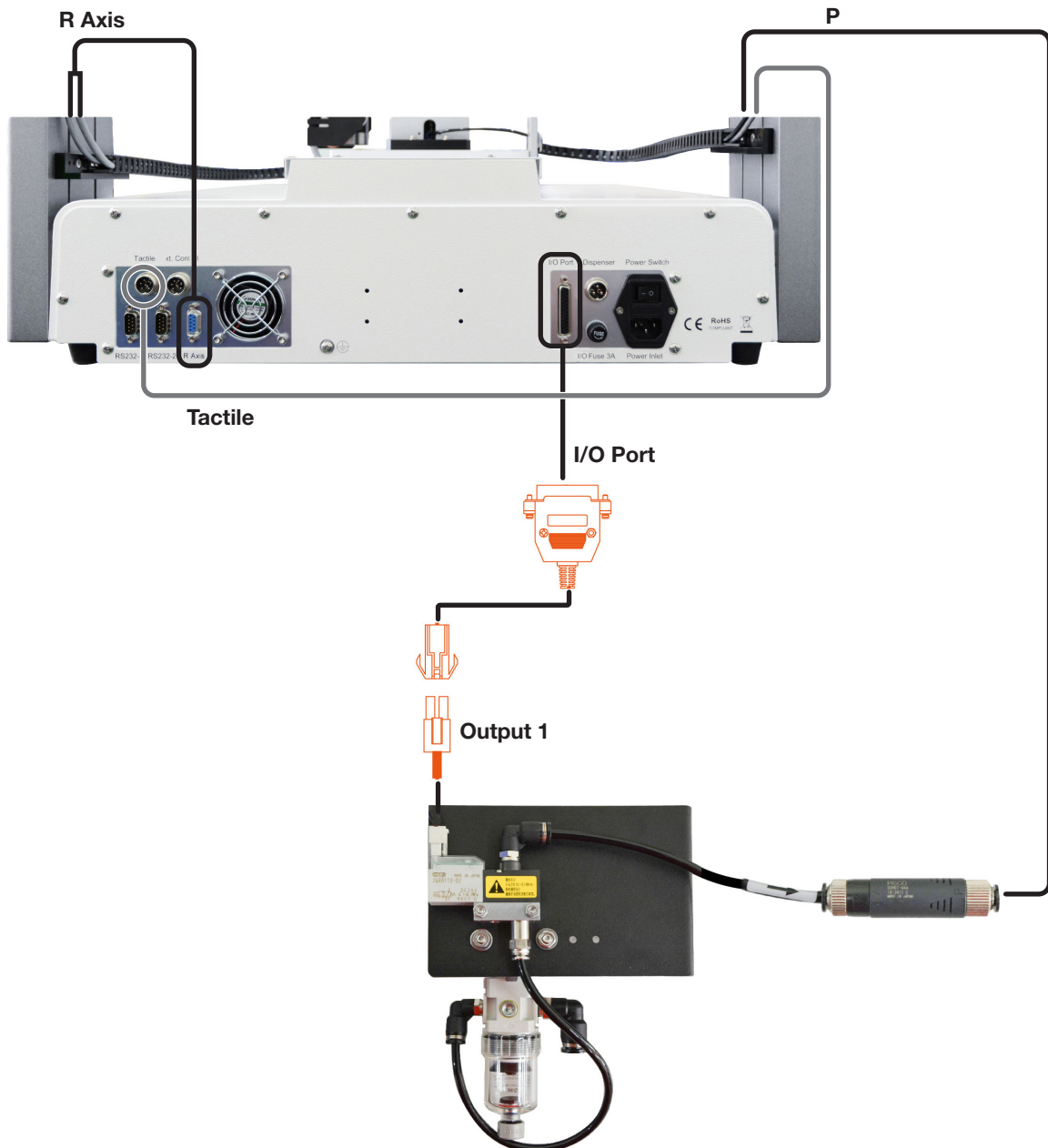
1. Use the supplied hardware to install the air pressure regulator on the robot frame.
2. Connect a clean, dry air supply to the 6 mm air input port on the pressure regulator.
3. Set the air supply to the regulator from 0–1 mPa (0–145 psi).



Install and Connect Components for a 4-Axis PROPlus System (continued)

Connect Cables

Make the cable connections shown below.



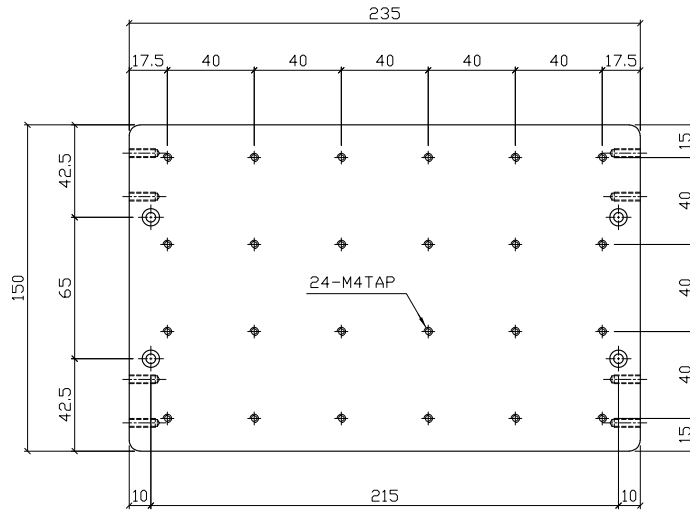
Prepare the Work Surface or Fixture Plate

Prepare the robot work surface or the optional fixture plate for secure placement of the workpiece. Fixture plate mounting hole templates for a rotating table are provided below.

NOTE: This section includes only the information unique to a 4-Axis PROPlus robot. For complete system information, refer to the **PROPlus / PRO Series Operating Manual**.

4-Axis PROPlus Fixture Plate Mounting Hole Template

NOTE: Dimensions are in millimeters.



Calibrate and Set Up a 4-Axis PROPlus System

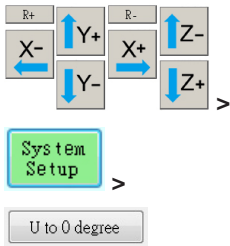
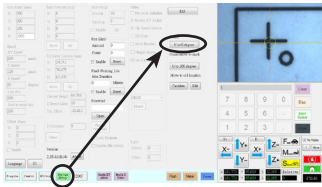

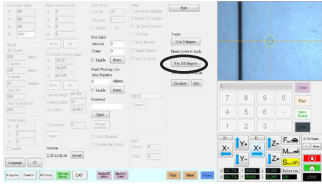
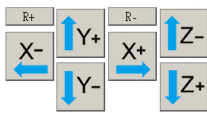
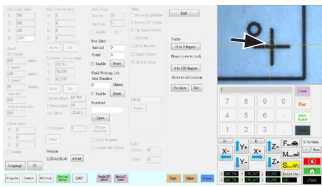

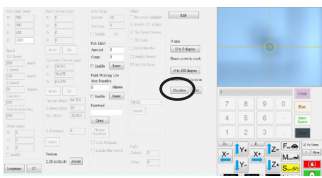
Correct system calibration and setup is critical for proper system operation. Before creating any programs or using the automatic offset update capabilities of a 4-Axis PROPlus robot, you must first calibrate the rotating table and set up the system as described in the **PROPlus / PRO Series Operating Manual**. This process must be performed at initial startup and also after any change to the system.

Examples of system changes include the following:

- Any time a component installed on the Z axis (such as the syringe barrel or camera) is moved.
- Any time a dispensing tip or nozzle is changed.


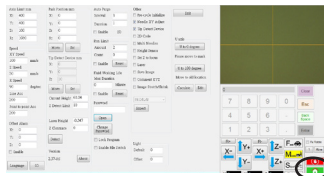
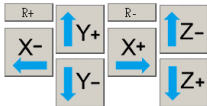
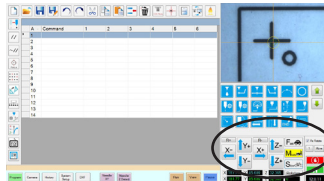
PREREQUISITES

- ❑ The system is fully installed as described in the **PROPlus / PRO Series Quick Start Guide** and in the installation section of the **PROPlus / PRO Series Operating Manual**.
- ❑ A test workpiece is positioned on the rotating table.

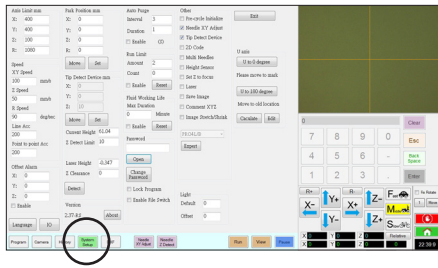
#	Click	Step	Reference Image
1		<ul style="list-style-type: none"> • Jog the camera to a setup point on the workpiece (select a point with easily recognizable features). • Click SYSTEM SETUP > U TO 0 DEGREE. 	
2		<ul style="list-style-type: none"> • Click U TO 180 DEGREE. The R axis rotates 180 degrees. 	
3		<ul style="list-style-type: none"> • Jog the camera to the setup point (which was just rotated 180 degrees). 	
4		<ul style="list-style-type: none"> • Click CALCULATE to finish the calibration. <p>NOTE: Click EDIT to view the coordinates in a Rotate Table Information window (not shown). If desired, you can edit the coordinates in the window.</p>	

Continued on next page

Calibrate and Set Up a 4-Axis PROPlus System (continued)

#	Click	Step	Reference Image
5		<ul style="list-style-type: none"> Click HOME to move the Z axis to the Home position. 	
6	<input checked="" type="checkbox"/> Fix Rotate > 	<ul style="list-style-type: none"> Select the FIX ROTATE checkbox to cause the X, Y, and R axes to move simultaneously. Jog the camera to the setup point on the workpiece. Use the R+ and R- jog keys to rotate the R axis, ensuring that the camera follows the setup point used in step 1. 	
7		<ul style="list-style-type: none"> Go to “Setting Up and Calibrating the System (Required)” in the PROPlus / PRO Series Operating Manual to complete the setup process. 	

DispenseMotion Screens Unique to 4-Axis PROPlus Systems



NOTE: This section includes only the information unique to a 4-Axis PROPlus robot. For complete system information, refer to the **PROPlus / PRO Series Operating Manual**.

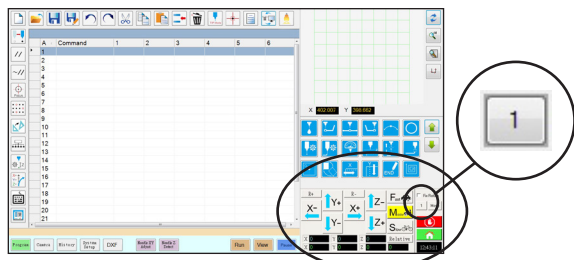
Item	Screen Capture	Description
Axis Limit		Sets the range limits within which the robot can move. A value higher than the default settings cannot be entered.
Speed		<p>Sets the speed (in mm/s) of the axis movement. For maximum speed specifications, refer to “Specifications” on page 4.</p> <p>NOTE: You can also change the jog speed settings by clicking the 1 next to the navigation and jogging window. Refer to “Navigation and Jogging Window for 4-Axis PROPlus Systems” on page 14 for detailed information.</p>
Park Position		<p>Sets the position to which the dispensing tip moves to (1) purge fluid or (2) when the Park Position command occurs in a program.</p> <p>Click MOVE to move the tip to the displayed coordinates set for Park Position. To change the setting, jog the tip to the new location, then click SET to set the location as the new Park Position.</p>

DispenseMotion Screens Unique to 4-Axis PROPlus Systems (continued)

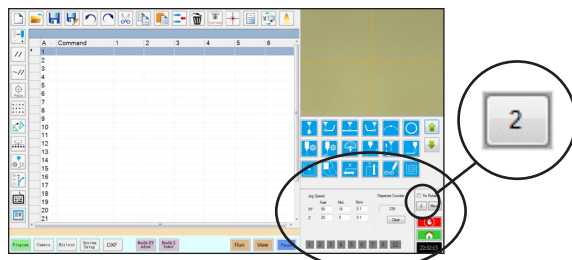
Navigation and Jogging Window for 4-Axis PROPlus Systems

Use the icons on the navigation and jogging window to move the dispensing tip. Click the 1 button to change the window to an alternate view that allows you to change the jog speed values. These windows also include an actual time / cycle time display, a dispense actuation counter, and coordinate value displays.

NOTE: This section includes only the information unique to a 4-Axis PROPlus robot. For complete system information, refer to the **PROPlus / PRO Series Operating Manual**.



View 1 of the navigation and jogging window on a 4-Axis PROPlus robot



View 2 of the navigation and jogging window on a 4-Axis PROPlus robot

View 1

Icon Name	Icon	Function
R+		Jogs the Z axis clockwise.
R-		Jogs the Z axis counterclockwise.

Both Views

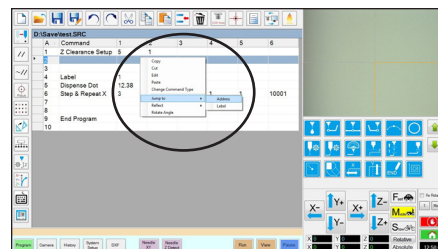
Icon Name	Icon	Function
Fix rotate		<p>Used in tandem with the R+ and R- buttons.</p> <p>When checked:</p> <ul style="list-style-type: none"> In CCD Mode, the camera rotates around a fixed point. In Tip Mode, the tip rotates around a fixed point. <p>When unchecked, the R axis rotates along the Z axis.</p>

DispenseMotion Screens Unique to 4-Axis PROPlus Systems (continued)

Primary View Screen Right-Click Functions for 4-Axis PROPlus Systems

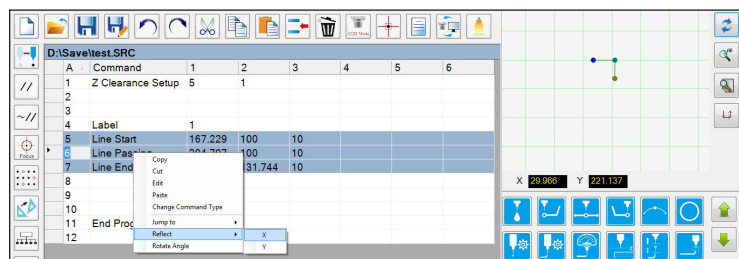
When the Program tab is selected, all the commands for the open dispense program are shown. Right-click on one or more selected commands to open a right-click menu. The functions shown below can be used on the selected commands.

NOTE: This section includes only the information unique to a 4-Axis PROPlus robot. For complete system information, refer to the **PROPlus / PRO Series Operating Manual**.

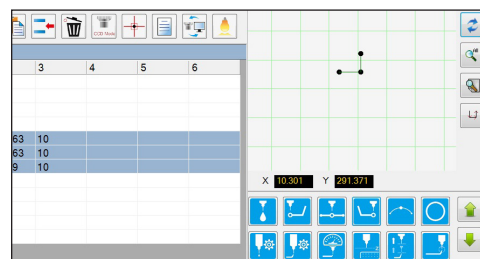


Item	Function
Copy	Copies the selected command
Cut	Copies and then deletes the selected command
Edit	Opens the edit window for the selected command
Paste	Pastes a cut or copied command into the selected command address
Change Command Type	Changes the selected command to a different command type
Jump To	Jumps to a specific Address command or Label command
Reflect	Flips the selected commands along the X or Y axis, thus creating a mirror image. An example is provided below.
4th Axis Follow Convert	Rotates a selected pattern based on the specified parameters. Refer to "How to Rotate a Pattern" on page 16 for an example.
Rotate Point	Rotates a single command. Refer to "How to Rotate a Command" on page 16 for an example.

How to Reflect (Mirror) a Pattern



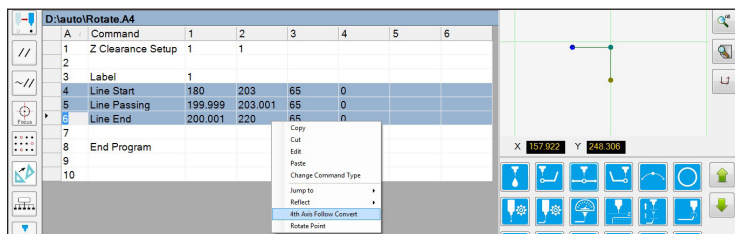
1. Select the lines to reflect, right-click to select REFLECT X or Y.



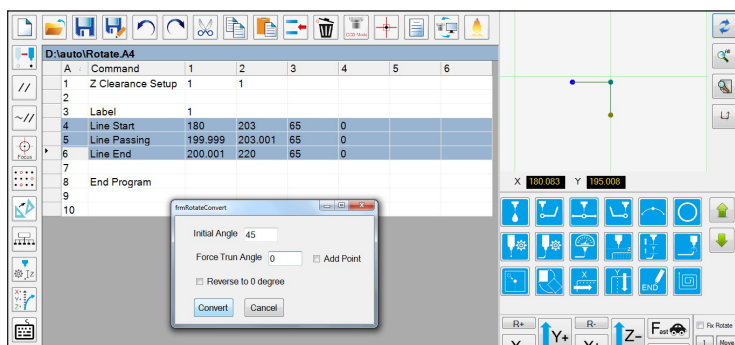
2. The system mirrors the selected pattern.

DispenseMotion Screens Unique to 4-Axis PROPlus Systems (continued)

How to Rotate a Pattern

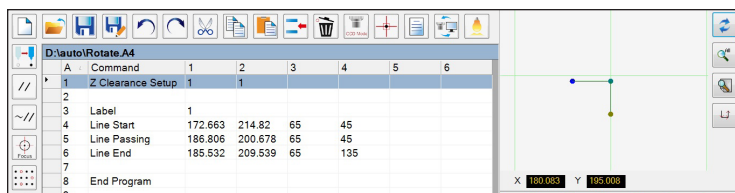


1. Select the lines to rotate, then right-click and select 4TH AXIS FOLLOW CONVERT.



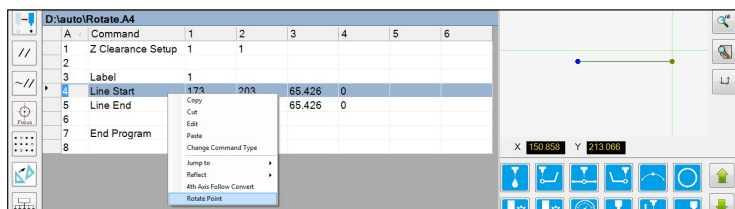
2. Enter parameter settings and click CONVERT to apply the settings to all selected commands.

Parameter	Description
Initial Angle	Sets the angle to which you want to rotate the pattern
Add Point	When selected, adds a Line Passing command to the program so that tip rotates to the desired angle before continuing with dispensing
Reverse to 0 Degree	When selected, overrides the settings and sets all R values to degree 0

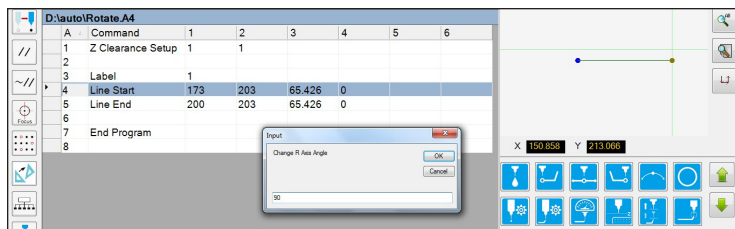


3. The system rotates the selected pattern.

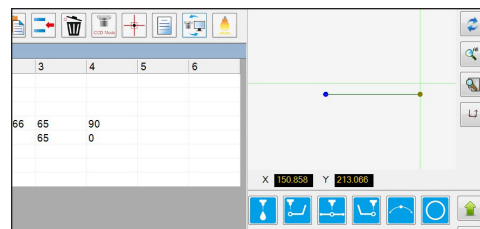
How to Rotate a Command



1. Select the command to rotate, then right-click and select ROTATE POINT.



2. Enter the desired degrees of rotation.



3. The system rotates the selected command.

Synchronous R Command for 4-Axis PROPlus Systems

NOTE: This command is unique to a 4-Axis PROPlus robot. For a complete list of all commands, refer to the PROPlus / PRO Series Operating Manual.

Synchronous R			
Click	Function		
Double-click address and select from drop-down menu	Sets how the robot axes move. When enabled (1, On), synchronizes all axes so that they move together. When disabled (0, Off), allows the axes to move independently. By default, this command is set to 1 (On). Default: 1, On (enabled)		
	Parameter	Description	
	0, Off	Disables the Synchronous R command	
	1, On	Enables the Synchronous R command	

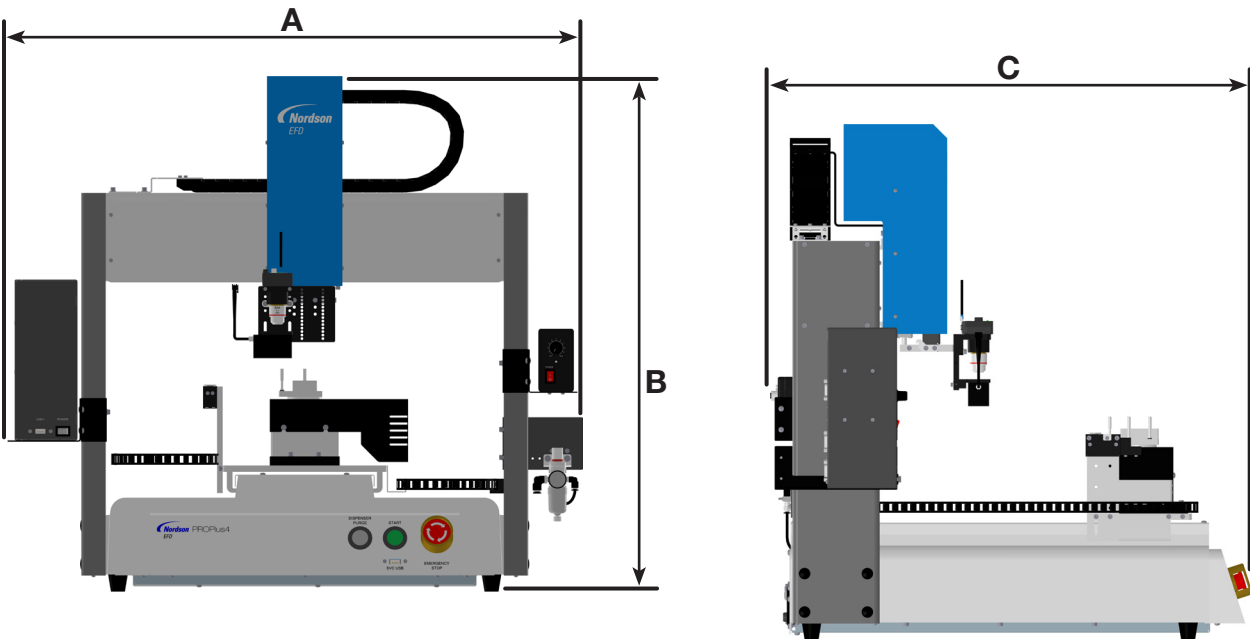
Synchronous R command window

Part Numbers

Part #	Part # (Europe)	Description
7364961	7366457	Robot, 4-Axis PROPlus with rotating table, 400 x 400 x 100 mm

Technical Data

Robot Dimensions

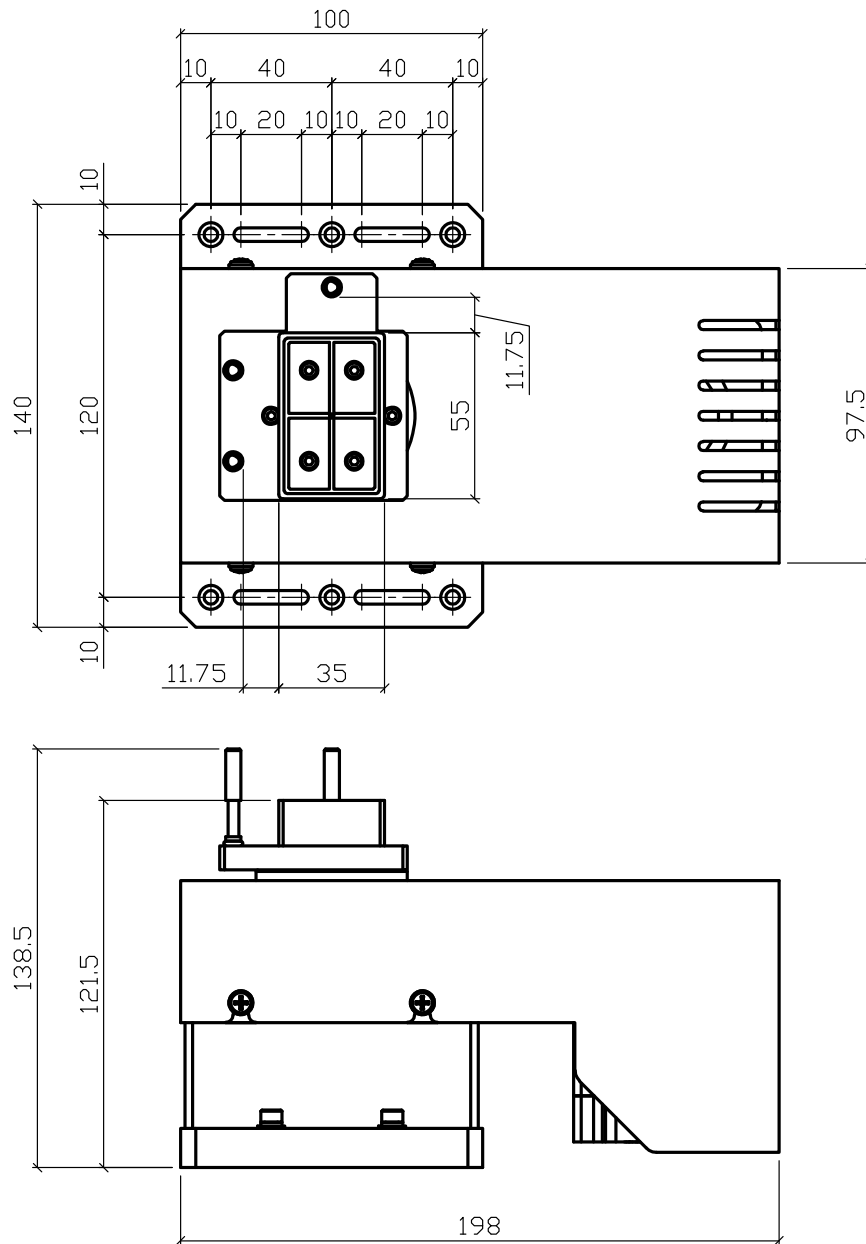


Dimension	4-Axis PROPlus
A* (width)	824 mm (32")
A* (width with Laser B controller**)	824 mm (32")
A* (width with Laser C controller**)	892 mm (35")
B (height)	737.5 mm (29")
C (depth)	674.5 mm (27")
*Dimension A includes the DispenseMotion controller (105.5 mm / 4"), light controller (70.5 mm / 2.8"), and pressure regulator assembly (78.5 mm / 3.1").	
**Not shown	

Technical Data (continued)

Rotating Table Assembly Dimensions

NOTE: Dimensions are in millimeters.



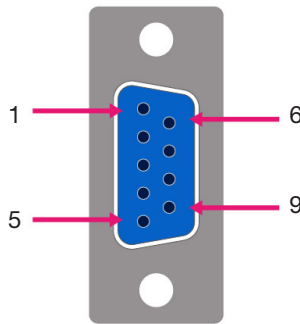
Technical Data (continued)

R Axis Port Pin Assignments

NOTES:

- Inputs are not polarity-sensitive.
- For complete wiring diagram information, refer to the **PROPlus / PRO Series Operating Manual**.

Pin	Description
1	Motor signal
2	Motor signal
3	Motor signal
4	Motor signal
5	Motor signal
6	Not connected
7	+5V (for home sensor)
8	Home sensor signal
9	GND (for home sensor)



Notes

NORDSON EFD ONE YEAR LIMITED WARRANTY

This Nordson EFD product is warranted for one year from the date of purchase to be free from defects in material and workmanship (but not against damage caused by misuse, abrasion, corrosion, negligence, accident, faulty installation, or by dispensing material incompatible with equipment) when the equipment is installed and operated in accordance with factory recommendations and instructions.

Nordson EFD will repair or replace free of charge any defective part upon authorized return of the part prepaid to our factory during the warranty period. The only exceptions are those parts which normally wear and must be replaced routinely, such as, but not limited to, valve diaphragms, seals, valve heads, needles, and nozzles.

In no event shall any liability or obligation of Nordson EFD arising from this warranty exceed the purchase price of the equipment.

Before operation, the user shall determine the suitability of this product for its intended use, and the user assumes all risk and liability whatsoever in connection therewith. Nordson EFD makes no warranty of merchantability or fitness for a particular purpose. In no event shall Nordson EFD be liable for incidental or consequential damages.

This warranty is valid only when oil-free, clean, dry, filtered air is used, where applicable.



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