

NVO2 Oscillator

Customer Product Manual
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**For parts and technical support, call the Industrial Coating
Solutions Customer Support Center at (800) 433-9319 or
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Table of Contents

Safety	1	Troubleshooting	24
Qualified Personnel.....	1	Repair	25
Intended Use.....	1	Remove the Panels and Gear Motor Cover	25
Regulations and Approvals.....	1	Replace the VFD	26
Personal Safety	2	Replace the Gear Motor	27
Fire Safety	2	Remove the Old Gear Motor	27
Grounding.....	3	Install the New Gear Motor	27
Action in the Event of a Malfunction	3	Replace the Carriage	30
Disposal.....	3	Remove the Air Cylinder	30
Description	4	Remove the Carriage Assembly.....	32
Installation	6	Install the Carriage Assembly.....	34
Remove the Oscillator from the Shipping Container	6	Install the Air Cylinder	36
Mount the Oscillator	8	Replace the Air Cylinder.....	38
Electrical Connections.....	8	Parts	40
Grounding	8	Oscillator Assemblies	41
Set the Parameters for VFD Configurations.....	11	Gear Motors	41
Set the Parameters for a Remote VFD	14	Inverters	42
Set the Cycle Rate	14	Sensors	42
Maximum Carriage Speed.....	15	Kits	42
Install the Gun Mount and Guns.....	16	Specifications	43
Connect Supply Air to the Air Connection Port.....	18	Wiring Diagrams	44
Adjust the Air Pressure.....	18		
Install Panels and Covers.....	18		
Operation	20		
Adjusting the Stroke	20		
Maintenance	22		

Contact Us

Nordson Corporation welcomes requests for information, comments, and inquiries about its products. General information about Nordson can be found on the Internet using the following address:

<http://www.nordson.com>

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Change Record

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Safety

Read and follow these safety instructions. Task-and equipment-specific warnings, cautions, and instructions are included in equipment documentation where appropriate.

Make sure all equipment documentation, including these instructions, is accessible to all person operating or servicing equipment.

Qualified Personnel

Equipment owners are responsible owners are responsible for making sure that Nordson equipment is installed, operated, and serviced by qualified personnel. Qualified personnel are those employees or contractors who are trained to safely perform their assigned tasks. They are familiar with all relevant safety rules and regulations and are physically capable of performing their assigned tasks.

Intended Use

Use of Nordson equipment in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to property.

Some examples of unintended use of equipment include:

- using incompatible materials
- making unauthorized modifications
- removing or bypassing safety guards or interlocks
- using incompatible or damaged parts
- using unapproved auxiliary equipment
- operating equipment in excess of maximum ratings

Regulations and Approvals

Make sure all equipment is rated and approved for the environment in which it is used. Any approvals obtained for Nordson equipment will be voided if instructions for installation, operation, and service are not followed.

All phases of equipment installation must comply with all federal, state, and local codes.

Personal Safety

To prevent injury follow these instructions:

- Do not operate or service equipment unless you are qualified.
- Do not operate equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Keep clear of moving equipment. Before adjusting or servicing any moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.
- Relieve (bleed off) hydraulic and pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- Obtain and read Safety Data Sheets (SDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.

Fire Safety

To avoid a fire or explosion, follow these instructions:

- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Provide adequate ventilation to prevent dangerous concentrations of volatile materials or vapors. Refer to local codes or your material SDS for guidance.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.
-

Grounding



WARNING: Operating faulty electrostatic equipment is hazardous and can cause electrocution, fire, or explosion. Make resistance checks part of your periodic maintenance program. If you receive even a slight electrical shock or notice static sparking or arcing, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.

Grounding inside and around the booth openings must comply with NFPA requirements for Class II Division 1 or 2 Hazardous Locations. Refer to NFPA 33, NFPA 70 (NEC articles 500, 502, and 516), and NFPA 77, latest conditions.

- All electrically conductive objects in the spray areas shall be electrically connected to ground with a resistance of not more than 1 megohm as measured with an instrument that applies at least 500 volts to the circuit being evaluated.
- Equipment to be grounded includes, but is not limited to, the floor of the spray area, operator platforms, hoppers, photoeye supports, and blow-off nozzles. Personnel working in the spray area must be grounded.
- There is a possible ignition potential from the charged human body. Personnel standing on a painted surface, such as an operator platform, or wearing non-conductive shoes, are not grounded. Personnel must wear shoes with conductive soles or use a ground strap to maintain a connection to ground when working with or around electrostatic equipment.
- Operators must maintain skin-to-handle contact between their hand and the gun handle to prevent shocks while operating manual electrostatic spray guns. If gloves must be worn, cut away the palm or fingers, wear electrically conductive gloves, or wear a grounding strap connected to the gun handle or other true earth ground.
- Shut off electrostatic power supplies and ground gun electrodes before making adjustments or cleaning powder spray guns.
- Connect all disconnected equipment, ground cables, and wires after servicing equipment.

Action in the Event of a Malfunction

If a system or any equipment in a system malfunctions, shut off the system immediately and perform the following steps:

- Disconnect and lock out electrical power. Close pneumatic shutoff valves and relieve pressures.
- Identify the reason for the malfunction and correct it before restarting the equipment.

Disposal

Dispose of equipment and materials used in operation and servicing according to local codes.

Description

See Figure 1. Vertical oscillators are designed to move spray guns up and down in a smooth, repetitious pattern for thorough coverage of parts being coated. The standard oscillator can support up to 40 kg (88 lb) or 8 automatic spray guns. The heavy duty oscillator can support up to 80 kg (176 lb) or 16 automatic spray guns. Oscillators are available with a Variable Frequency Drive (VFD) to control the stroke speed.

Oscillators are typically mounted to either the floor or a horizontal in/out positioner, which moves the oscillator on-and-off-line. Refer to Table 1 for component descriptions.

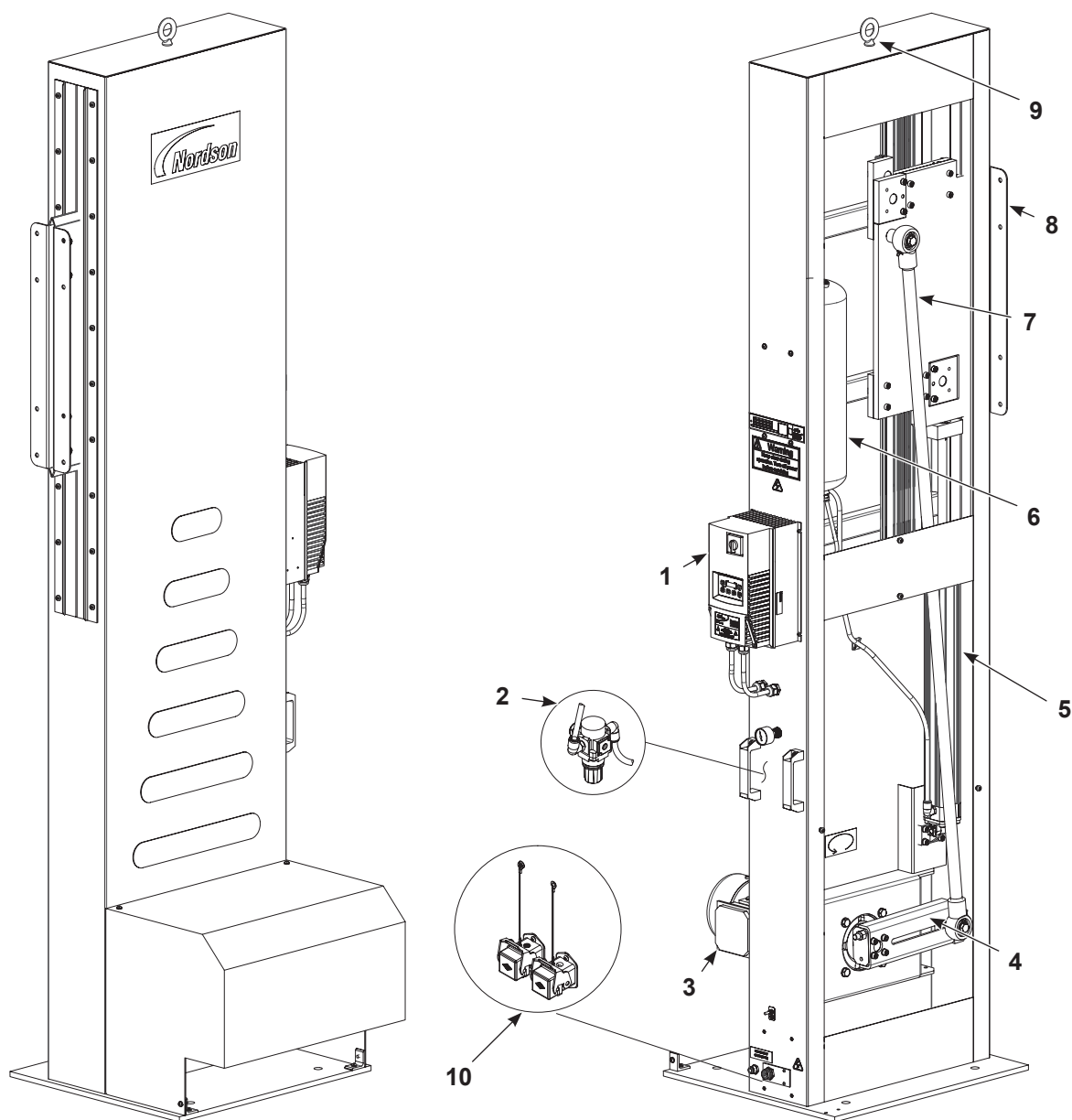


Figure 1 Major Components

Table 1 Component Descriptions

Item	Component	Function
1	VFD	Controls the stroke speed
2	Internal Air Regulator	Controls supply air to the accumulator and air cylinder
3	Gear Motor	Rotates the torque arm to move the gun carriage
4	Adjustable Torque Arm	Moves the gun carriage and is used to adjust the stroke length between 100-450 mm (4-18 in.)
5	Air Cylinder	Counter balances the gun carriage during oscillator operation
6	Accumulator	Stores air to operate the air cylinder
7	Connecting Rod	Connects the gun carriage to the torque arm
8	Gun Carriage	Mounting point for the gun mounts and guns
9	Eye Bolt	Lift point for moving the oscillator
10	Sensor and Motor Connectors	Connections for the sensor and motor cables from the system controller; Only on models without a VFD that use proximity sensor
—	Proximity Sensor	Installed on models that do not use a VFD; Sends signal to the controller to indicate that the gun carriage has reached the lower limit of travel

Installation



WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

Read and understand the following procedures before installing the oscillator in a system. Contact a local Nordson representative regarding these procedures if necessary.

Installation consists of the following tasks:

- Remove the oscillator from the shipping container
- Mount the oscillator
- Install the gun mount and guns
- Electrical connections

Remove the Oscillator from the Shipping Container



WARNING: Only use approved and tested lifting equipment that can lift at least 270 Kg (600 lb) or more. Lifting straps, ropes, or chains used with the lifting equipment must also be capable of supporting at least 270 Kg (600 lb) or more. Failure to observe this warning could result in death, injury, or property damage.

1. Remove the top, cross supports, and all of the sides on the shipping container.
2. See Figure 2. Attach lifting equipment to the eye bolt (5). Carefully lift the oscillator upright and off of the shipping container.
3. Stand the oscillator upright onto the floor or onto the in/out positioner.
4. Remove the screws (1) securing the access panels (2, 3) and gear motor cover (4).

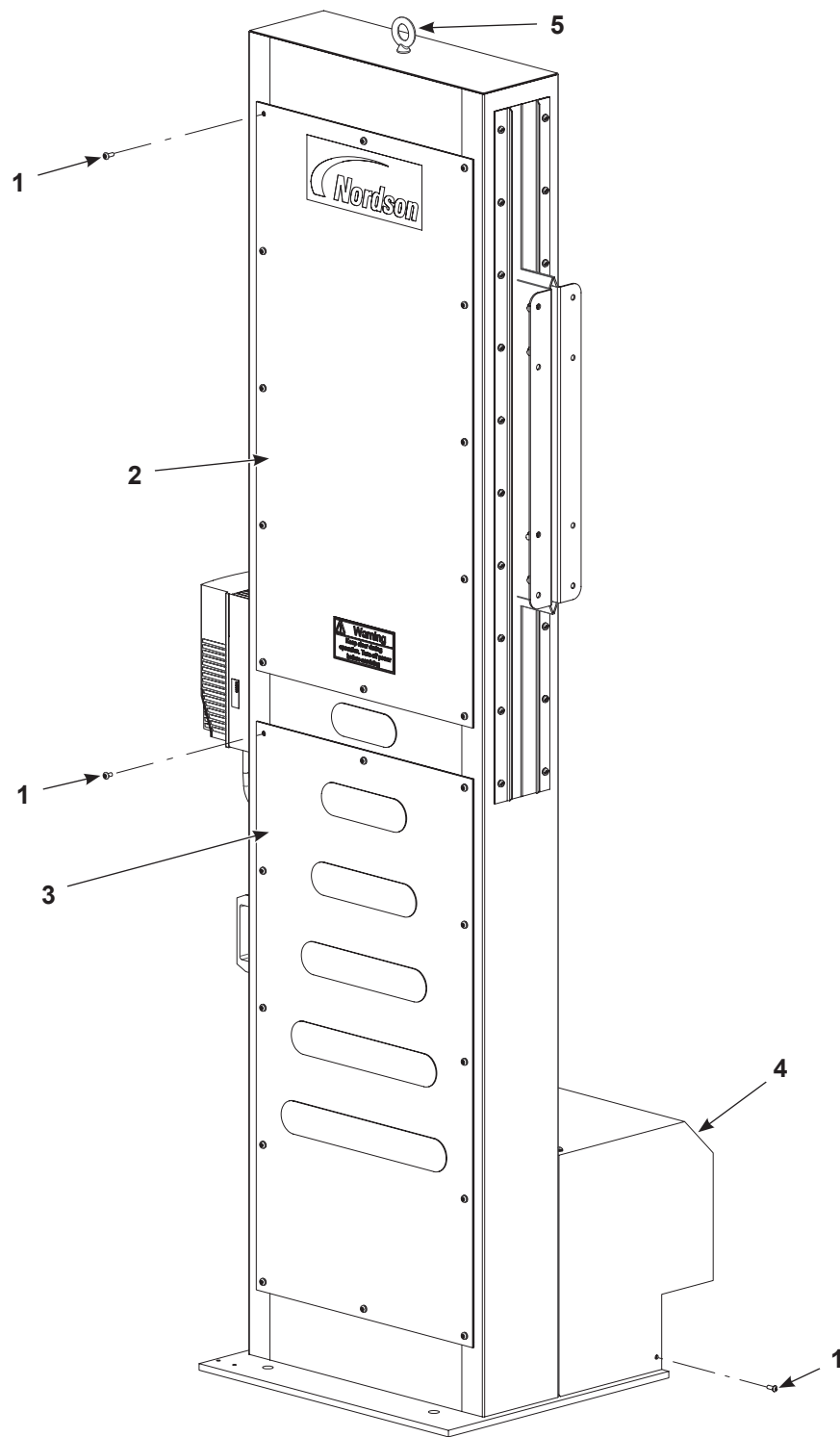


Figure 2 Removing the Covers

- | | | |
|-----------------------|-----------------------|-------------|
| 1. Screw | 3. Lower access panel | 5. Eye bolt |
| 2. Upper access panel | 4. Gear motor cover | |

Mount the Oscillator



CAUTION: The oscillator is designed for use with a Nordson in/out positioner. If using another type of in/out positioner, make sure that it can support at least 340 Kg (750 lb) or more.

The oscillator is typically installed onto manual or automatic in/out positioners, a fixed stand, or bolted to the floor. A Nordson in/out positioner ships with fasteners included in a hardware kit for oscillator installations. Other fasteners may be required if using another type of in/out positioner.

NOTE: Using an in/out positioner — The payload capacity with hoses, cables and mounting hardware is 40 kg (88 lb) or 8 automatic guns for the standard oscillator and 80 kg (176 lb) for the heavy duty oscillator. On the heavy duty oscillator, if the payload meets or exceeds 60 kg (132 lb), about 12 guns or more, it will be necessary to install the counterweight kit. This kit is used as a counter balance to prevent the rear wheels of the in/out positioner from unloading. Refer to the *Kits* section to order a counterweight kit.

1. IN/OUT POSITIONERS ONLY: Perform the following:

- a. Set the oscillator onto the in/out positioner and secure it to the in/out positioner carriage.
 - b. See Figure 3. Install the counterweights (4) to the oscillator using the screw and (6) and lock washer (5). Tighten the screw securely.
2. If mounting the oscillator to the floor or a fixed stand, use the existing four mounting holes (8) in the oscillator base (9). If necessary, drill new holes into the base or floor. Use properly sized fasteners to secure the oscillator.



CAUTION: The rubber plug on the gear box vent must be removed to allow proper venting during use.

3. Remove the rubber plug (1) from the pressure vent (2).

Electrical Connections



WARNING: Connect the oscillator power cable to a disconnect or other device that will allow power to be locked out for service. Failure to observe this warning may result in personal injury or death.

NOTE: Check the gear motor ID plate to ensure that the correct voltage is being supplied to the gear motor.

Grounding

See Figure 3. Ground the oscillator using the grounding post (12) to a true earth ground. Test the ground and make sure it meets local code requirements.

ATEX MOTOR ONLY: If the oscillator has an ATEX motor, make sure that the gear motor ground wire is attached to the ground post (7).

1. Oscillators with Dual Voltage motor:

NOTE: The oscillator motor terminal box is wired for high-voltage on dual voltage (230/460 or 230/380 - 415) models. If using a low-voltage power supply for the oscillator, re-wire the terminal box for low-voltage and the appropriate 9 or 6 terminal motor versions. This applies to a dual-voltage oscillator regardless if it is a version with or without a VFD.

- a. See Figure 3. Remove the screws (15) securing the junction box cover (14).
- b. See Figure 22 (with VFD) or Figure 24 (without VFD), page 44 or 46 for low-voltage wiring diagram and motor terminals. Determine if the motor is a 6 or 9 terminal motor. Change the connection of the terminal jumpers included with the motor as shown for low voltage for the appropriate 6 or 9 terminal version.
- c. See Figure 3. Reinstall the junction box cover (14) using the removed screws (15).

2. Oscillators without VFD: Perform the following steps:

- a. See Figure 3. Connect the motor cable from the system controller to the connector (10).
- b. Connect the proximity sensor cable from the system controller to the connector (11). If necessary, see Figure 23 or Figure 24, page 45 or 46 for the wiring diagram.

3. Oscillators with VFD: Perform the following steps:

- a. Connect a motor cable to the connector (13). See Figure 21 or Figure 22, page 43 or 44 for wiring diagram.

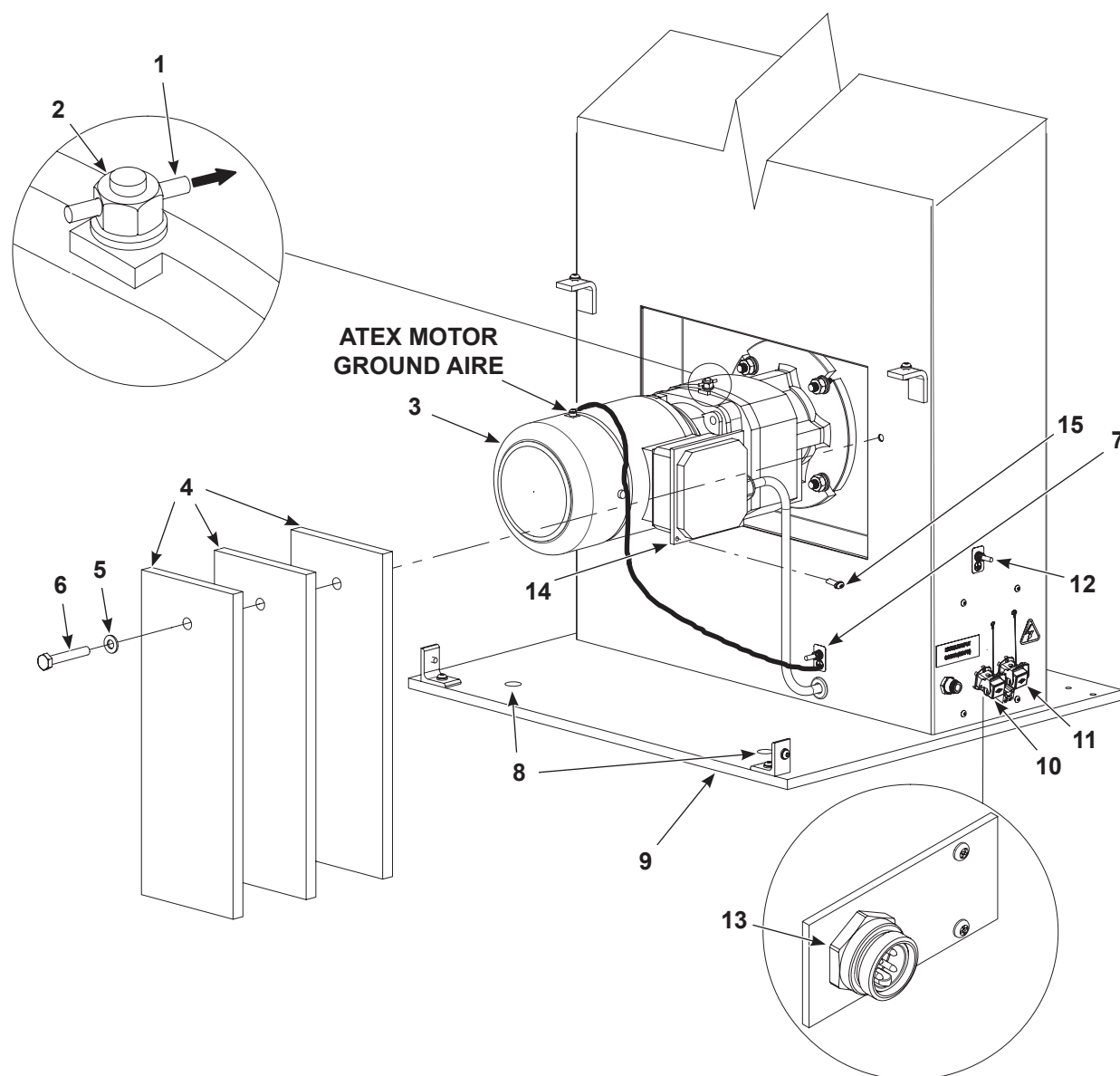


Figure 3 Installation

- | | | |
|-------------------|-----------------------------|-----------------------------|
| 1. Rubber plug | 6. Screw | 11. Connector (without VFD) |
| 2. Gear box vent | 7. Ground post | 12. Grounding post |
| 3. Gear motor | 8. Mounting holes | 13. Connector (with VFD) |
| 4. Counterweights | 9. Oscillator base | 14. Junction box cover |
| 5. Lock washer | 10. Connector (without VFD) | 15. Screws (4) |

Set the Parameters for VFD Configurations

Table 2 lists the Nordson-specific parameter settings along with parameters that are specific to the supply voltage.

NOTE: Before putting the oscillator into service, verify that the voltage-specific parameters settings are corrected.

Review the following before verifying the VFD parameters.

- The RUN and RF buttons on the VFD keypad are inactive.
- Power to the oscillator can be locked out by turning the VFD power switch to OFF.
- The oscillator can immediately start when power is applied to the VFD. Warn personnel in the area to stand away from the oscillator before turning the VFD power switch to ON.
- The oscillator can be stopped at any time using the STOP button.
- The oscillator cannot be restarted from the VFD keypad. Cycle power to the VFD to restart the oscillator.
- The VFD displays cycles/minute of the oscillator stroke. The speed range is 9.5-40 cpm. Use the up and down arrow buttons to change the speed.

See Figure 4 and refer to Table 2. Use the following procedure to set or change the VFD parameters.

1. Turn the VFD power switch (1) to ON. If the oscillator starts to operate, press STOP on the keypad (2).
2. Press **M** on the keypad (2) to access the parameters.
3. If **PASS** then **0000** appears on the display (3). Press the up or down arrow keys to enter password **225**. Press **M** to accept the password.

OR

If **Pnnn** appears, press the up or down arrow keys to select a parameter number.

4. To change a parameter setting:
 - a. Press **M**. The current parameter setting appears.
 - b. Press either the up or down arrow buttons until the desired setting appears on the display.
 - c. Touch **M** to save the parameter setting and exit.

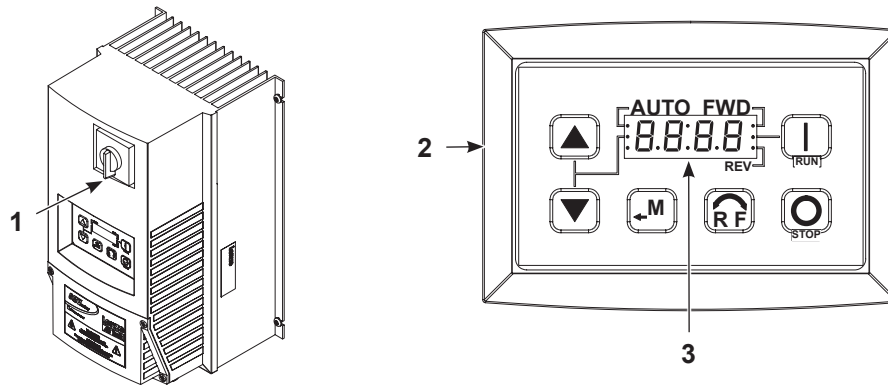


Figure 4 Setting VFD Parameters

Table 2 Nordson-Specific and Voltage-Specific Parameters Settings

Nordson Settings ^(A)				
Parameter				
P100: Start Control Source: Terminal Strip				
P102: Minimum Frequency ^(B)				
P103: Maximum Frequency ^(B)				
P104: Acceleration Time				
P105: Deceleration Time				
P110: Start Method: Start on Power-Up				
P177: Speed Units: RPM Display ^(C)				
P178: Scale Factor for P177				
Settings Specific to Supply Voltage				
Supply Voltage (Vac)	200 - 230 ^(D)	380 - 415	460	575/600
Oscillator Part Number	1601175 1602380	1601227 1601229 1602381 1602382	1601231 1602383	1601233 1602384
Parameter	Setting			
P107: Line Volts Select ^(E)	0 or 1	0	1	1
P302: Motor Voltage	208	400	460	575
P303: Motor Current	4.0	2.1	1.8	1.5
P304: Motor Frequency	60	50	60	60
P305: Motor Speed	1650	1650	1650	1650
(A) The Nordson settings must be re-entered if replacing a VFD that shipped with the oscillator. (B) The minimum and maximum frequency settings limit the oscillator stroke between 10-40 cpm. (C) This value Represents cpm. (D) The gear motor junction box must be configured for low voltage. (E) Voltage supplied to the VFD determines the setting: 0 - if the input voltage is 200-208 or 380-415 Vac 1 - if the input voltage is 230, 460, or 575 Vac NOTE: If necessary to reset all parameters to the VFD factory default settings, go to Parameter 199: Enter “3” if the voltage supply is 60 Hz Enter “4” if the voltage supply is 50 Hz All parameters listed in Table 2 must be re-entered after a factory default reset.				

Set the Parameters for a Remote VFD

Make sure that the following parameters are set on the remote VFD before operating the oscillator:

Parameter	Description
Motor-Specific	Must match the data on the motor identification plate
Minimum Output Frequency ^(A)	20 Hz
Maximum Output Frequency ^(A)	90 Hz
^(A) The minimum and maximum frequency settings limit the oscillator stroke between 9-41 cpm.	

Set the Cycle Rate

See Figure 5. A cycle is one full up and down stroke. The cycle rate range is 9 - 41 cycles/min. and is adjusted by varying the VFD frequency output. Use the following equation to determine the desired frequency:

$$\text{Rate (cycles/min.)} \times 2.2 = \text{Frequency (Hz)}$$

For example, the frequency output for the desired rate of 20 cycles/min. is:

$$20 \times 2.2 = 44 \text{ Hz}$$

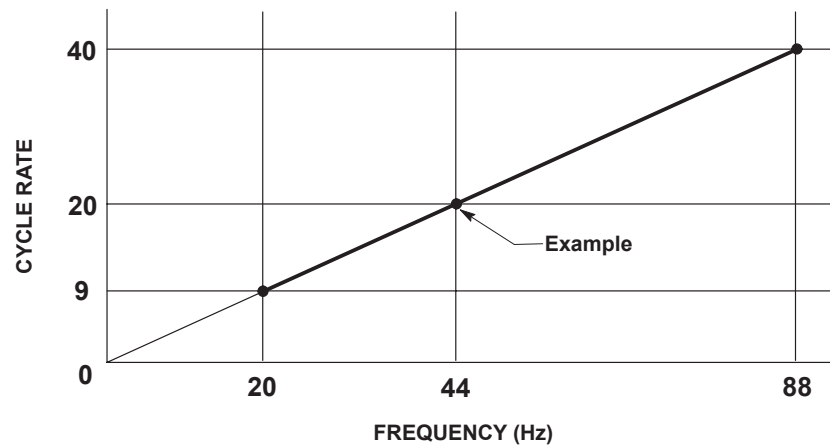


Figure 5 Frequency-to-Cycle Rate

Maximum Carriage Speed

See Figure 6. The maximum allowable carriage speed is 100 ft/min. The maximum speed occurs at the midpoint of an up or down stroke and is a function of stroke length and cycle rate. At stroke lengths greater than 9.5 in., the cycle rate is limited by the maximum carriage speed as shown.

Use the following equation to determine the maximum cycle rate:

$$382/\text{stroke} = \text{Max. Rate (cycles/min.)}$$

For example, given a known stroke of 12 in., the maximum cycle rate is:

$$382/12 = 31.8 \text{ cycles/min.}$$

NOTE: Refer to the *Adjusting the Stroke* section to adjust the stroke.

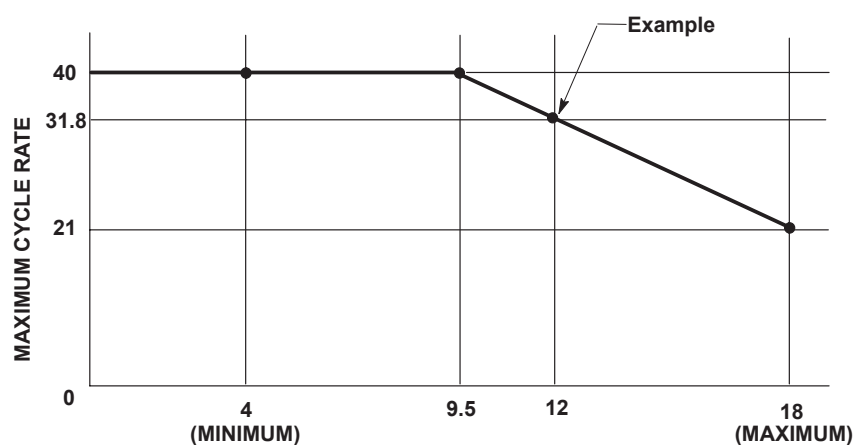


Figure 6 Maximum Carriage Speed

Install the Gun Mount and Guns

See Figure 7. The maximum oscillator payload is 80Kg (176 lb) at a distance of 610 mm (24 in.) from the mounting range.

1. Install the spray guns onto the desired gun mount.
2. Install the gun mount onto the gun carriage (2) using the appropriate hardware.
3. Make sure that the gun mount does not interfere with the operation of the oscillator (1).

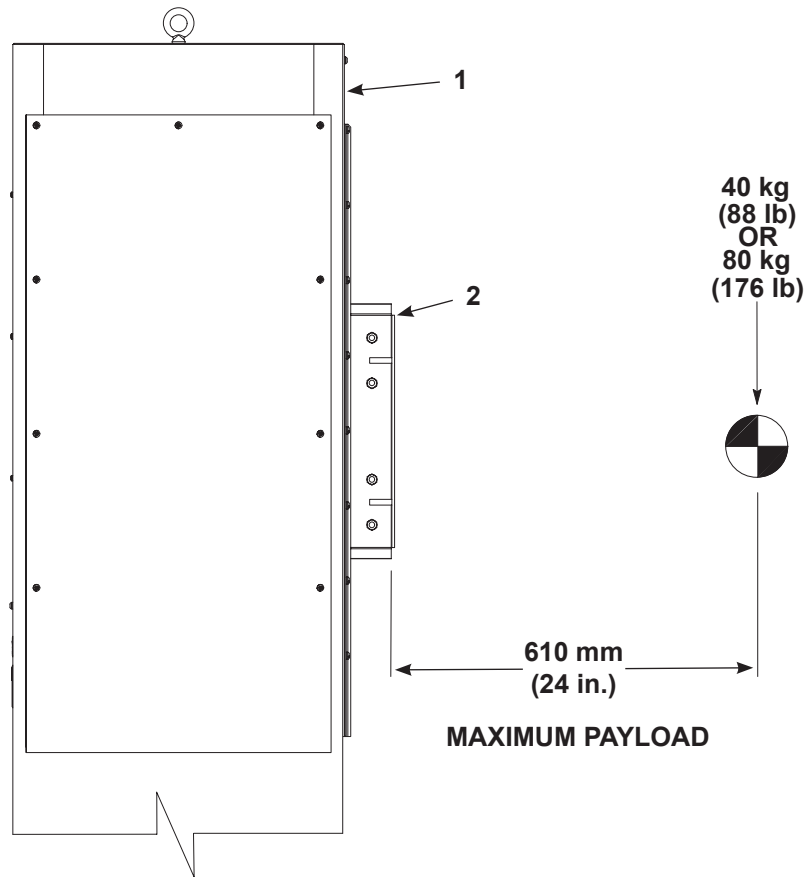


Figure 7 Installing the Gun Mount and Guns

Connect Supply Air to the Air Connection Port

1. See Figure 8. Connect an 8-mm supply air line (4) to the air fitting (3) on the oscillator (5).
2. Perform the *Adjust the Air Pressure* procedure to balance the load of the guns and the mounting hardware.

Adjust the Air Pressure

The air pressure must be adjusted to balance the guns and mounting hardware (load) that are mounted to the gun carriage. The air pressure operating requirements follow:

Air Pressure Operating Requirements Standard Oscillator
1. 4 bar (20 psi) ^A to 3.4 bar (50 psi) ^B
A: Without guns or mounting hardware
B: Maximum capacity of 40 Kg (88 lb)

Air Pressure Operating Requirements Heavy Duty Oscillator
1. 4 bar (20 psi) ^A to 5.8 bar (85 psi) ^B
A: Without guns or mounting hardware
B: Maximum capacity of 80 Kg (176 lb)

Perform the following:

1. Disconnect and lock out power to the oscillator.
2. Make sure that the hoses and cables are connected to the guns.
3. Remove the screws securing the lower access panel to the oscillator as shown in Figure 2.
4. Using the air pressure regulator (1), start at 1.4 bar (20 psi) and slowly increase the air pressure until the connecting rod (2) can be manually pulled into the horizontal position and remain there.
5. Manually move the load slightly up, then down. If necessary, adjust the air pressure until the required force to move the load up and down is about the same in both directions.
6. Install the lower access panel using the screws as shown in Figure 2. Tighten the screws securely.

Install Panels and Covers

See Figure 2. Make sure that all covers and panels are installed and secured using the screws.

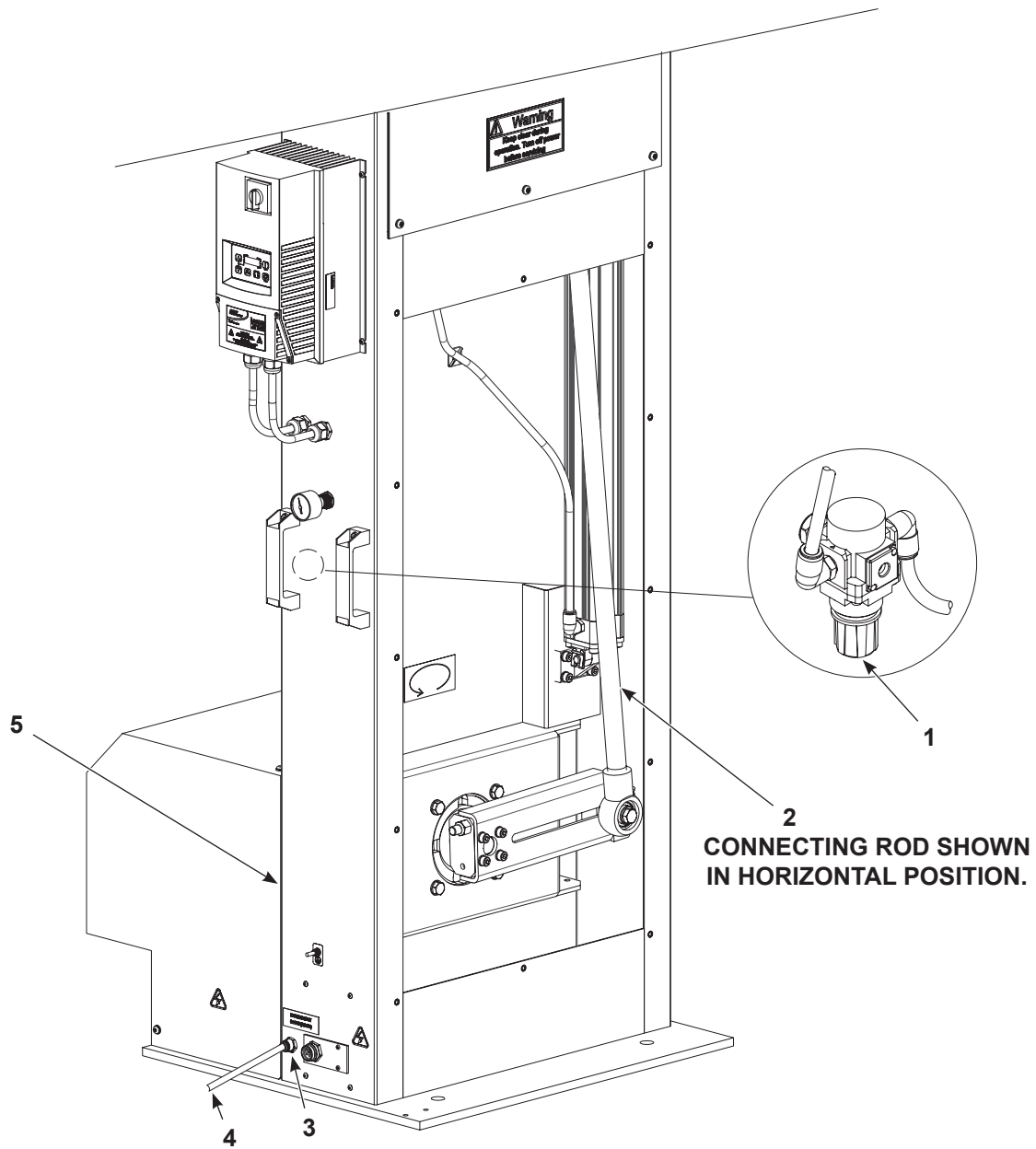


Figure 8 Supply Air Connection

- | | | |
|---------------------------|-------------------------|---------------|
| 1. Air pressure regulator | 3. Air fitting | 5. Oscillator |
| 2. Connecting rod | 4. 8-mm supply air line | |

Operation

Operation is dependent upon the application requirements. Refer to the System Documentation manual that shipped with the system for operating procedures.



WARNING: Failure to observe the following could result in property damage, injury, or death:

- Before starting the oscillator, make sure nothing interferes with the gun mount or spray guns.
- The oscillator could immediately start when power is applied to the VFD. Warn personnel in the area to stand away from the oscillator before turning the VFD power switch to ON.
- Never open the access panels while the oscillator is operating.

Adjusting the Stroke

See Figure 9. Perform the following to adjust the stroke:

1. Lock out power to the oscillator.
2. If the load has not been balanced, perform the Adjust the Air Pressure procedure.
3. Remove the screws securing the bottom access panel as shown in Figure 2.
4. Perform the following to adjust the stroke:
 - a. Loosen the screw (2) at the bottom of the connecting rod (1).
 - b. Turn the adjustment nut (4) clockwise to decrease or counterclockwise to increase the distance between the center lines in the middle of the motor shaft (3) and the center of the connecting rod screw (2). The stroke equals this distance multiplied by 2.
 - c. Tighten the screw (2) at the bottom of the connecting rod (1) to 90 - 100 ft-lbs.
5. Install lower access panel using the lock washers and screws as shown in Figure 2. Tighten the screws securely.



CAUTION: After performing this procedure, the cycle rate may need to be adjusted to prevent the carriage from over-speeding. The maximum carriage speed is 100 fpm.

6. If necessary, adjust the cycle rate. Refer to the *Maximum Carriage Speed* section for the procedures.

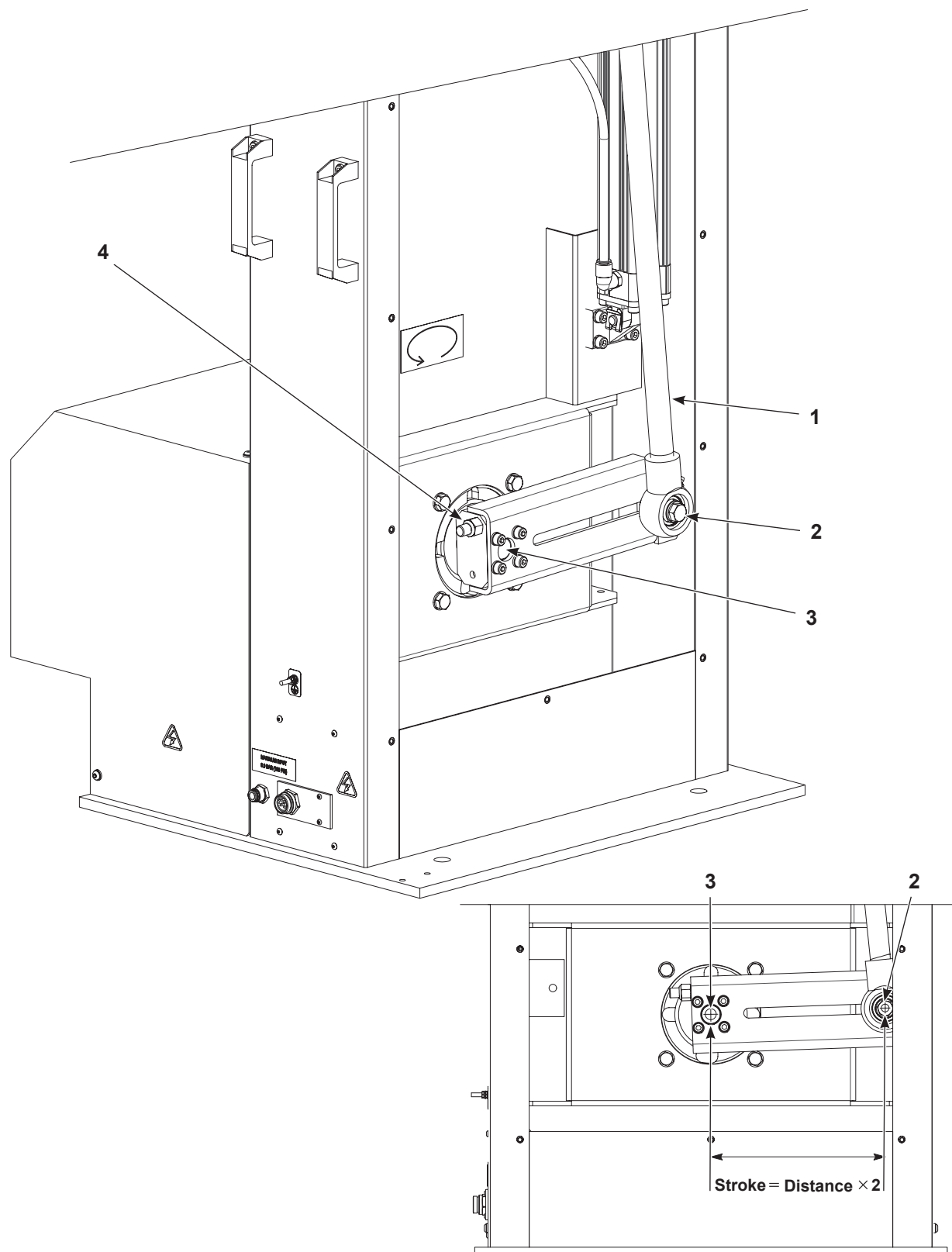


Figure 9 Changing the Stroke

- 1. Connecting rod
- 2. Bottom connecting rod screw

3. Motor shaft

4. Adjustment nut

Maintenance



WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.



WARNING: Disconnect equipment from the line voltage before servicing the equipment. Failure to observe this warning may result in a severe shock.

Refer to Table 3 and Figure 10.

Table 3 Maintenance Schedule

Description	Item	Frequency	Procedure
General Cleaning	—	Monthly or 500 Hours	Clean the interior of the oscillator
Gun Carriage and V-rails	1, 2	Monthly or 250 Hours	Wipe overspray off the V-rails and lubricate the V-rail running surface with a light coat of 3-IN-ONE® oil or ISO Grade 22-32 machine oil.
		Monthly or 250 Hours	Inspect the V-rail wear. Scoring indicates that the rails and carriages must be replaced.
Crank Arm Rod Ends	3, 4	Monthly or 500 Hours	Make sure that the screws are tight. Torque value: 120 - 135 N · m (90 - 100 ft-lb).
Motor	5	Monthly or 500 Hours	Clean the grille over the fan on the rear of the motor. Make sure that it is clear of any dirt buildup.
		First 500 Hours/five weeks of operation	Check the motor current draw and compare the reading to the value on the motor identification plate. Actual draw should be 50 - 70% of the value shown on the identification plate.
Air Cylinder	6	Monthly or 500 Hours	Disconnect power. With the air on, listen for air leaks. Repair or replace leaking components.
Gearbox	7	10,000 hours or 2 years	Replace the gear oil.

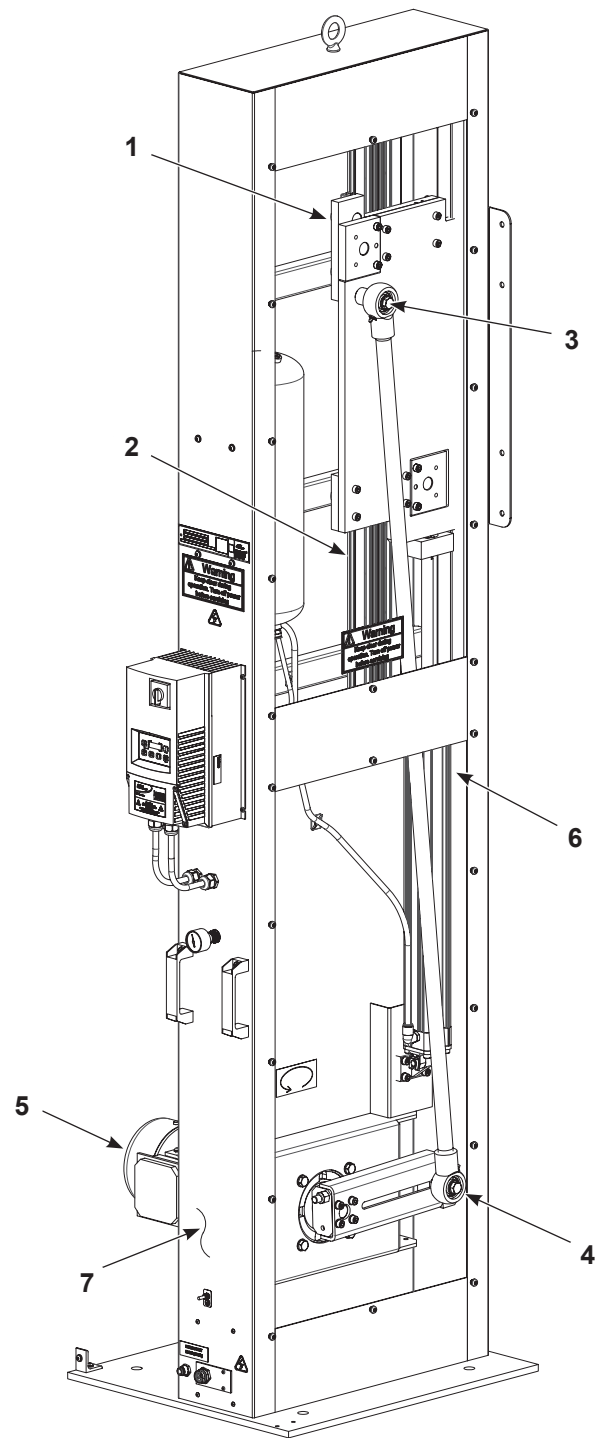


Figure 10 Maintenance Points

- | | | |
|-----------------------------|--------------------------------|-----------------|
| 1. Carriage | 4. Bottom connection rod screw | 6. Air cylinder |
| 2. V-rail | 5. Motor | 7. Gearbox |
| 3. Top connecting rod screw | | |

Troubleshooting



WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

These troubleshooting procedures cover only the most common problems. If you cannot solve a problem with the information given here, contact your local Nordson representative for help.

Problem	Possible Cause	Corrective Action
1. Excessive vibration	Worn gun carriage V-rail or bearings.	Check for excessive V-rail wear. Replace the V-rails and carriages if necessary.
	Worn gearbox.	Check for excessive noise, heat, current draw. Replace gearbox if necessary.
	Worn air cylinder.	Check for air leaks, looseness, and binding. Replace the air cylinder if necessary.
2. Oscillator will not start	Motor does not start.	Check all electrical connections leading to the motor. Verify that the proper line voltage is supplied to the motor. Check all motor circuit breakers. Check motor rotation. The motor should be free from obstructions.
	Excessive load.	Check the load. Reduce the load if it exceeds the oscillator limits.
	Incorrect or no air pressure.	Adjust air pressure.
	VFD parameters incorrectly set.	Refer to Table 2 on page 13. Set VFD parameters to factory defaults and re-enter Nordson parameters.
	Jumper wire incorrectly installed or not installed at VFD terminals.	Refer to Figure 12, item 11 on page 26. Verify jumper installation, or install jumper as shown.
3. Cannot change speed with VFD keys.	VFD parameters incorrectly set.	Refer to Table 2 on page 13. Set VFD parameters to factory defaults and re-enter Nordson parameters.
4. VFD does not display Cycles Per Minute	VFD parameters incorrectly set.	Refer to Table 2 on page 13. Set VFD parameters to factory defaults and re-enter Nordson parameters.
5. VFD indicates fault F_HF (high DC bus voltage)	Air pressure set incorrectly.	Adjust pressure as described on page 18.
	VFD parameters incorrectly set.	Refer to Table 2 on page 13. Set VFD parameters to factory defaults and re-enter Nordson parameters.

Repair



WARNING: Allow only qualified personnel to perform the following tasks. Following the safety instructions in this document and all other related documentation.

Remove the Panels and Gear Motor Cover

1. See Figure 11. Remove the screws (1) from the applicable panel (2, 3) or gear motor cover (4) to gain access to an oscillator part.
2. When repairs are complete, install the applicable cover using the screws, and tighten securely.

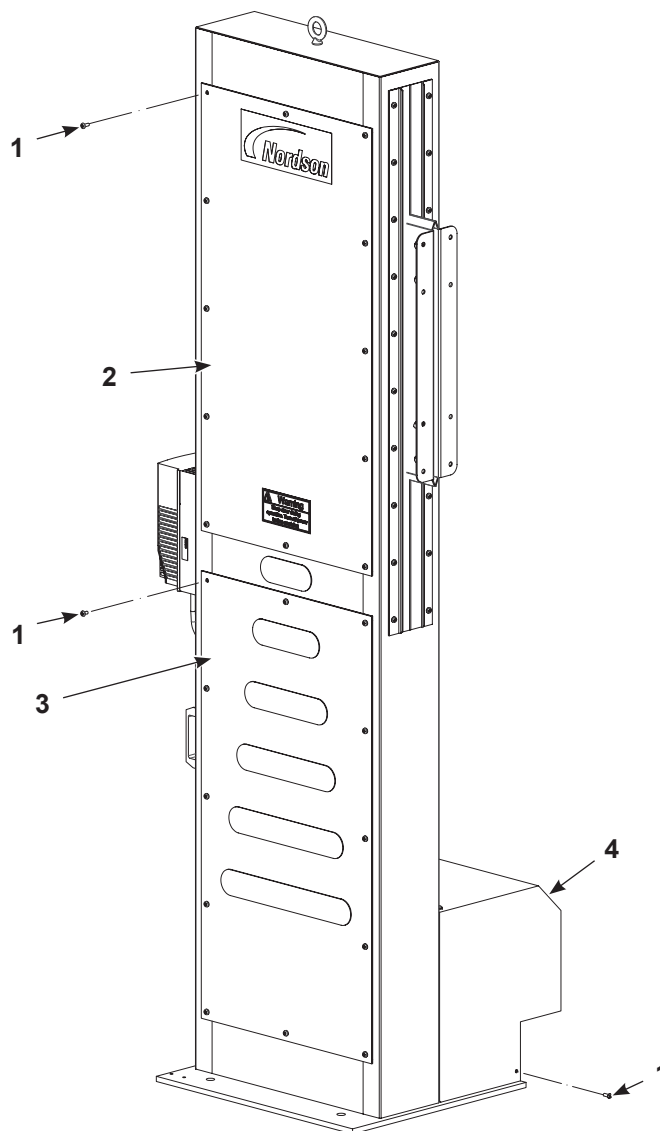


Figure 11 Removing the Covers

- | | |
|-----------------------|-----------------------|
| 1. Screw | 3. Lower access panel |
| 2. Upper access panel | 4. Gear motor cover |

Replace the VFD



WARNING: Disconnect and lock out power to the oscillator before performing repairs. Make sure that the VFD power switch is OFF.

1. Remove the screws (8) securing the cover (7) to the VFD (1).
2. Loosen the strain reliefs (10). Disconnect the gear motor cable wires (6) and the supply power cable wires (5) from the terminal board (9).
3. Remove the screws (4) and lock washers (3) securing the VFD (1) to the oscillator (2).
4. Install the new VFD (1) to the oscillator (2) using the lock washers (3) and screws (4). Tighten the screws securely.
5. Insert the motor cable and power supply cable through the strain reliefs (10). Connect the gear motor cable wires (6) and power supply cable wires (5) to the terminal board (9) as shown.
6. Obtain a 50-mm (2-in.) length of 18 AWG wire. Strip 6 mm (0.25 in.) of insulation from each end of the wire to create a jumper wire.
7. Connect the jumper wire (11) between terminals 1 and 4 as shown.
8. Install the cover (7) using the screws (8). Tighten the screws securely.
9. Refer to the *Set the Parameters for VFD Configurations* in the *Installation* section to reset the parameters.

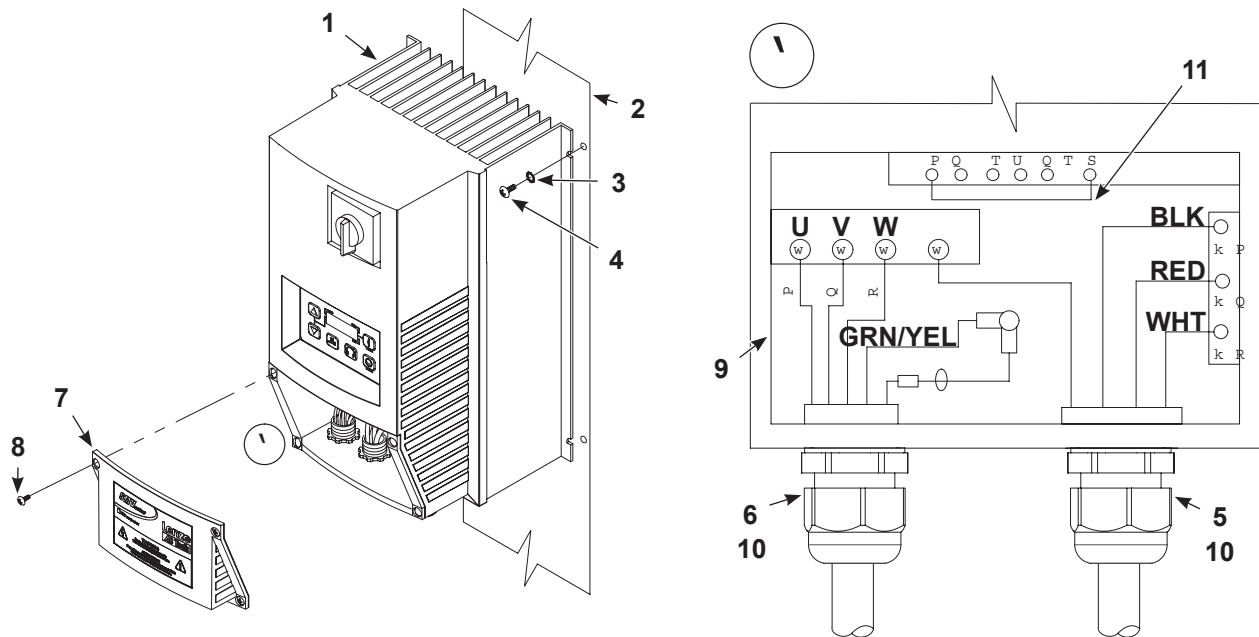


Figure 12 Replacing the VFD

- | | | |
|---------------|-----------------------------|-------------------|
| 1. VFD | 5. Power supply cable wires | 9. Terminal board |
| 2. Oscillator | 6. Gear motor cable wires | 10. Strain relief |
| 3. Lockwasher | 7. Cover | 11. Jumper wire |
| 4. Screw | 8. Cover screw | |

Replace the Gear Motor



CAUTION: The gear motor is heavy. An assistant is required to safely remove the gear motor from the oscillator.

Remove the Old Gear Motor

1. See Figure 13. Move the gun carriage (1) to the top stroke position. Use a block (2) as shown to support the gun carriage (1).
 2. Disconnect power and relieve the air pressure.
- NOTE:** Check the gear motor ID plate on the new motor being installed to ensure that the motor voltage matches voltage of power being supplied to the gear motor.
3. On the old oscillator gear motor being replaced, remove the screws (12) and lock washers (13) securing the cover to the junction box (11).
 4. Remove the cable strain relief (10) and set aside to use with the new gear motor.
 5. Disconnect the cable wires inside the junction box (11). Carefully pull the cable (9) out of the junction box.
 6. Remove the lower access panel as shown in Figure 11.
 7. Remove the bottom connecting rod screw (22), washer (21), and the spacer (19). Then remove the four torque arm screws (23) and the washers (24) from the clamp hub (16) to remove the torque arm (18).
 8. Loosen the M8 screw (15) to remove the clamp hub (16) from the gear motor shaft (7).
 9. Remove the nuts (3), lock washers (4), and flat washers (5) securing the gear motor (6), and remove gear motor from the oscillator. Do not remove the screws (17).

Install the New Gear Motor

1. Install the new gear motor using the nuts (3), lock washers (4), and the flat washers (5). Tighten the nuts to 50 N·m (37 ft-lb).
2. Install the shaft key (8) onto the new gear motor (6).
3. Guide the clamp hub (16) onto the gear motor shaft until it bottoms out and tighten the M8 screw (15).
4. Connect the torque arm (18) to the clamp hub (16) using the screws (23) and washers (24). Tighten the screws to 26 N·m (19 ft-lb).
5. Connect the connecting rod (20) back to the torque arm (18) by screwing the bottom connecting rod screw (22) with washer (21) and spacer (19) through the torque arm (18) and into the stroke adjustment block (14). Torque to 120-135 N·m (90-100 ft-lb).

NOTE: The oscillator gear motor can be supplied with either a 6 or 9 terminal motor. The version installed on a unit is determined by the number of terminals inside the oscillator gear motor junction box. The 6 and 9 terminal motors are interchangeable as long as the motor junction box is correctly wired and terminal jumpers are installed for the proper power supply voltage where the oscillator is installed.

6. Remove the screws (12) and washers (13) securing the cover to the junction box (11) on the new gear motor. Install the strain relief (10) from the old gear motor.

7. Insert the cable (9) into the strain relief (10).

Wiring diagram schematic by Oscillator configuration

Oscillator Configuration	Figure used in Wiring Diagram Section
Oscillator with VFD, high-voltage gear motor, motor junction box with 6 or 9 terminals.	Figure 21, page 43
Oscillator with VFD, low-voltage gear motor, motor junction box with 6 or 9 terminals.	Figure 22, page 44
Oscillator without VFD, high-voltage gear motor, motor junction box with 6 or 9 terminals.	Figure 23, page 45
Oscillator without VFD low-voltage gear motor, motor junction box with 6 or 9 terminals.	Figure 24, page 46

8. Refer to above table. Based on local power voltage being supplied to the oscillator motor and oscillator configuration, refer to appropriate electrical schematic figure used in *Wiring Diagrams* section. Determine if the new gear motor is a 6 or 9 terminal motor. Configure the connection of the terminal jumpers and connect the cable wires to junction box (11). Connect the cable wires to the junction box (11). Refer to the *Wiring Diagrams* section if necessary.

9. See Figure 13. Tighten the cable strain relief (10).

10. Install the cover to the junction box (11) using the screws (12) and the lock washers (13). Tighten the screws securely.

11. If the oscillator had an ATEX motor with a separate wire attached to the ground, make sure the new gear motor ground wire is attached to the ground post.

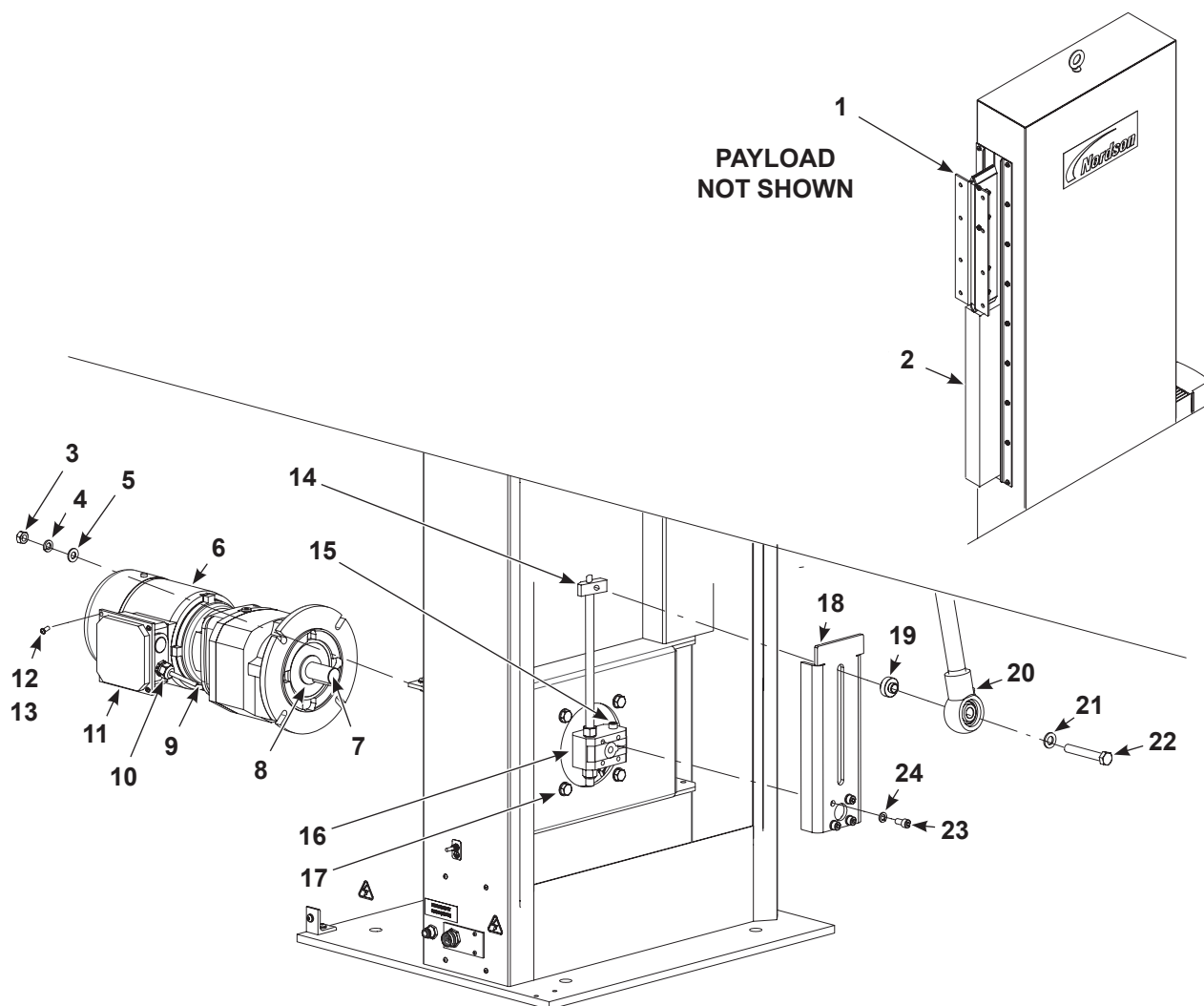


Figure 13 Replacing the Gear Motor

- | | | |
|-----------------|-------------------------|---------------------------------|
| 1. Gun carriage | 9. Cable | 17. Screws |
| 2. Block | 10. Cable strain relief | 18. Torque arm |
| 3. Nuts | 11. Junction box | 19. Spacer |
| 4. Lock washers | 12. Screws | 20. Connecting rod |
| 5. Flat washers | 13. Lock washers | 21. Washer |
| 6. Gear motor | 14. Adjustment block | 22. Bottom connecting rod screw |
| 7. Motor shaft | 15. M8 screw | 23. Screws |
| 8. Shaft key | 16. Clamp hub | 24. Washers |

Replace the Carriage

NOTE: The V-rail will also get replaced with the carriage.

Use the following procedure to replace the bearings. Read the following before performing these procedures:

- Remove the payload from the gun mounting plate assembly.
- Have the Carriage Kit on hand. Refer to the *Parts* section for ordering information.
- A block is required to secure the gun mounting plate assembly in the top stroke position. Make sure that the block can support the weight of the gun mounting plate assembly.

Remove the Air Cylinder

1. See Figure 14. Remove the guns and mounting hardware from the mounting plate bracket (1).
2. Move the gun mounting plate assembly (1) to the top stroke position. Use a block (2) as shown to secure the assembly (1).
3. Relieve the air pressure to the oscillator.
4. Disconnect the air line (3) from the air cylinder fitting (4).
5. Remove the clips (6) and pin (7) securing the air cylinder (5) to the bracket (8).
6. Remove the two screws securing the rod end mount (10) to the gun mount plate (11), and collapse the air cylinder rod into the housing. Remove the air cylinder from the oscillator.

NOTE: The gun mounting plate assembly needs to be guided down because it will drop down under its own weight.

7. Move the gun mounting plate assembly (1) to the bottom stroke position by carefully removing the block (2).
8. Remove the carriage assembly from the oscillator. Refer to the *Remove the Carriage Assembly* section.

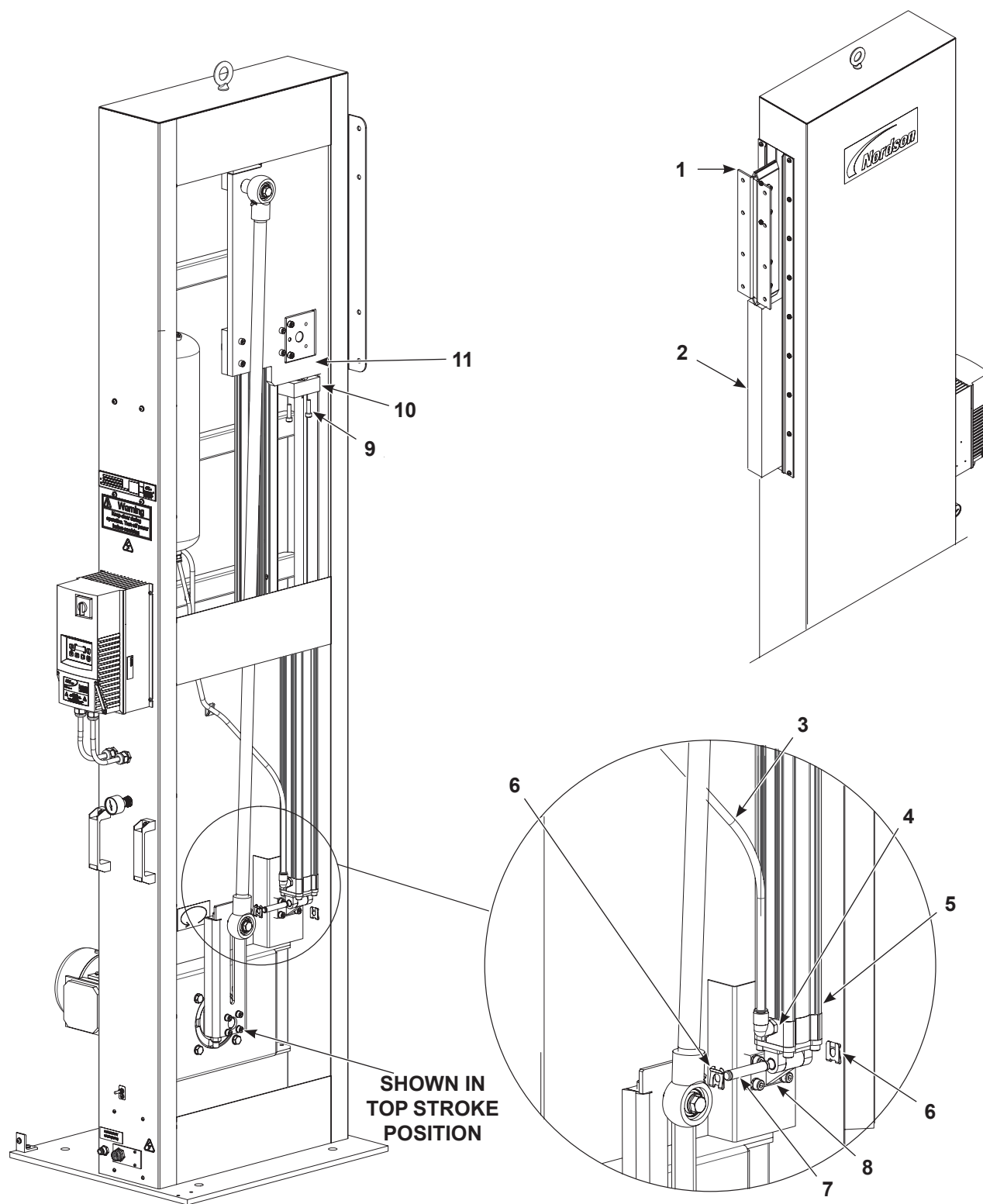


Figure 14 Removing the Air Cylinder

- | | | |
|--------------------------------|-----------------|-------------------------|
| 1. Gun mounting plate assembly | 5. Air cylinder | 9. Rod end mount screws |
| 2. Block | 6. Clips | 10. Rod end mount |
| 3. Air line | 7. Pin | 11. Gun mount plate |
| 4. Air cylinder fitting | 8. Bracket | |

Remove the Carriage Assembly

See Figure 15.



CAUTION: Be careful when removing the screw (7) in the next step. The gun carriages (1) will slide down until gun plate assembly (4) contacts the bottom of the gun plate assembly opening.

1. Remove the screw (7) and washer (6) securing the connecting rod (2) to the gun plate (4). Swing the connecting rod to the left and away from the gun plate assembly.



CAUTION: Be careful when removing the screws (5) in the next step. The gun carriages (1) will slide off the V-rails (3) if no precaution is taken. Before removing the screws in the next step, secure cable ties around the V-rails and through the holes in the V-rail to keep the gun carriages (1) from falling.

2. Remove the eight screws (5) securing the gun plate assembly (4) to the gun carriage (1). Remove the gun plate assembly (4).
3. Carefully, cut the cable ties from the V-rails (3) while guiding the gun carriages (1) down and off the V-rails.
4. Remove the screws (8) supporting the V-rail, and remove the V-rail from the oscillator.
5. Replace the Gun Carriage Assembly. Refer to the *Install the Carriage Assembly* section on page 34.

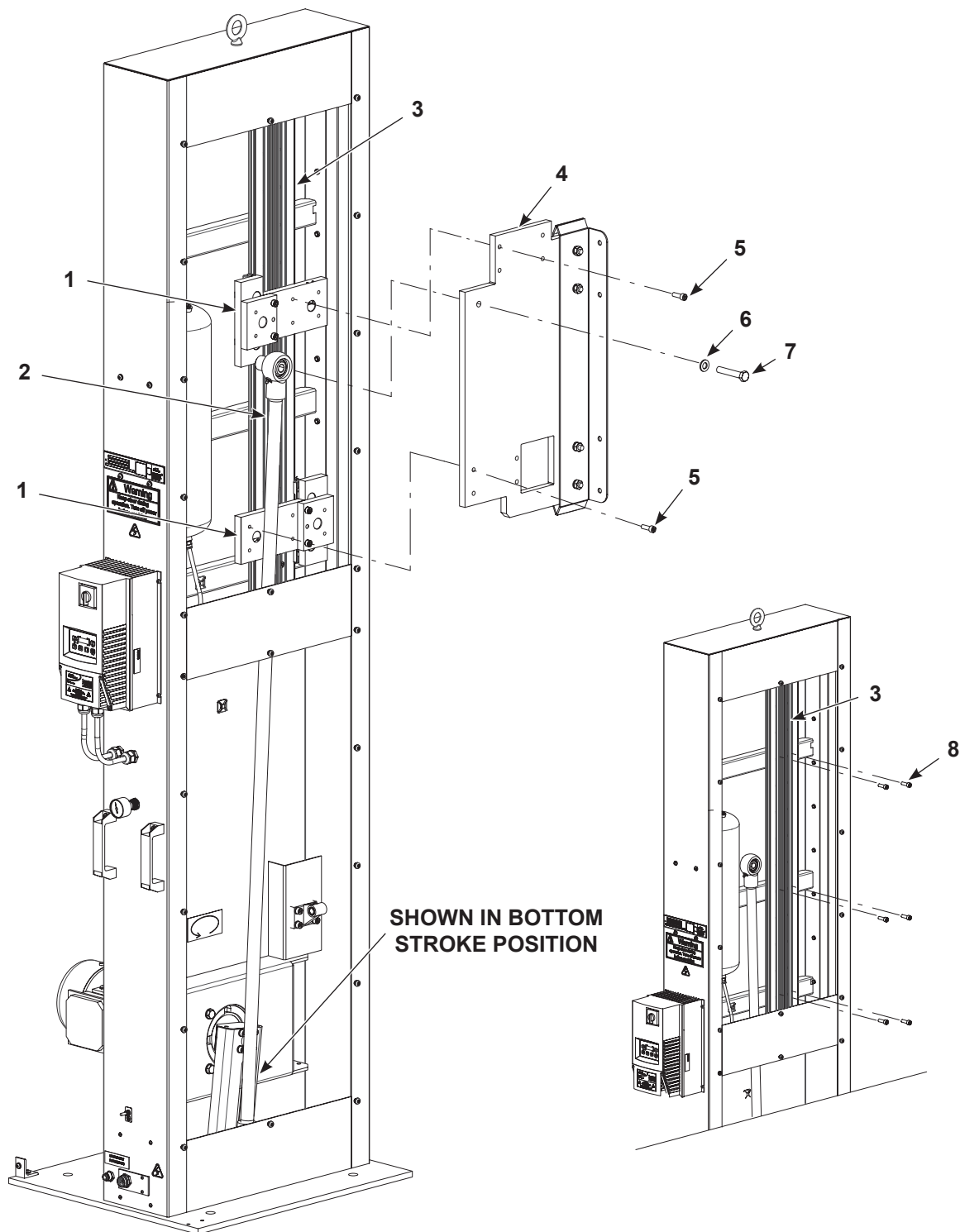


Figure 15 Removing the Carriage Assembly

- | | | |
|-------------------|--------------------------------|-------------------------|
| 1. Carriage | 4. Gun mounting plate assembly | 7. Connecting rod screw |
| 2. Connecting rod | 5. Gun plate screws | 8. V-rail screws |
| 3. V-rail | 6. Connecting rod washer | |

Install the Carriage Assembly

The carriage assembly kit includes the carriages secured to the V-rail with carriage cable ties and V-rail cable ties. Do not remove either kind of cable tie until instructed to do so in the procedure below.

1. See Figure 16 and Figure 17. Secure the V-rail to the oscillator using the V-rail screws (8).
2. Lubricate the V-rail running surface with a light coat of 3-IN-ONE oil or ISO Grade 22-32 machine oil.
3. Cut and remove the carriage cable ties and install the gun mounting plate assembly (4) onto the upper and lower carriages (1) using the gun plate screws (5).
4. Once the gun plate assembly is secure, cut and remove the V-rail cable ties.
5. Apply grease to the threads of the connecting rod screw (7). Install the connecting rod (2) using the connection rod washer (6) and screw (7). Torque to 90-100 ft lbs.
6. Install the air cylinder. Refer to the *Install the Air Cylinder* section.

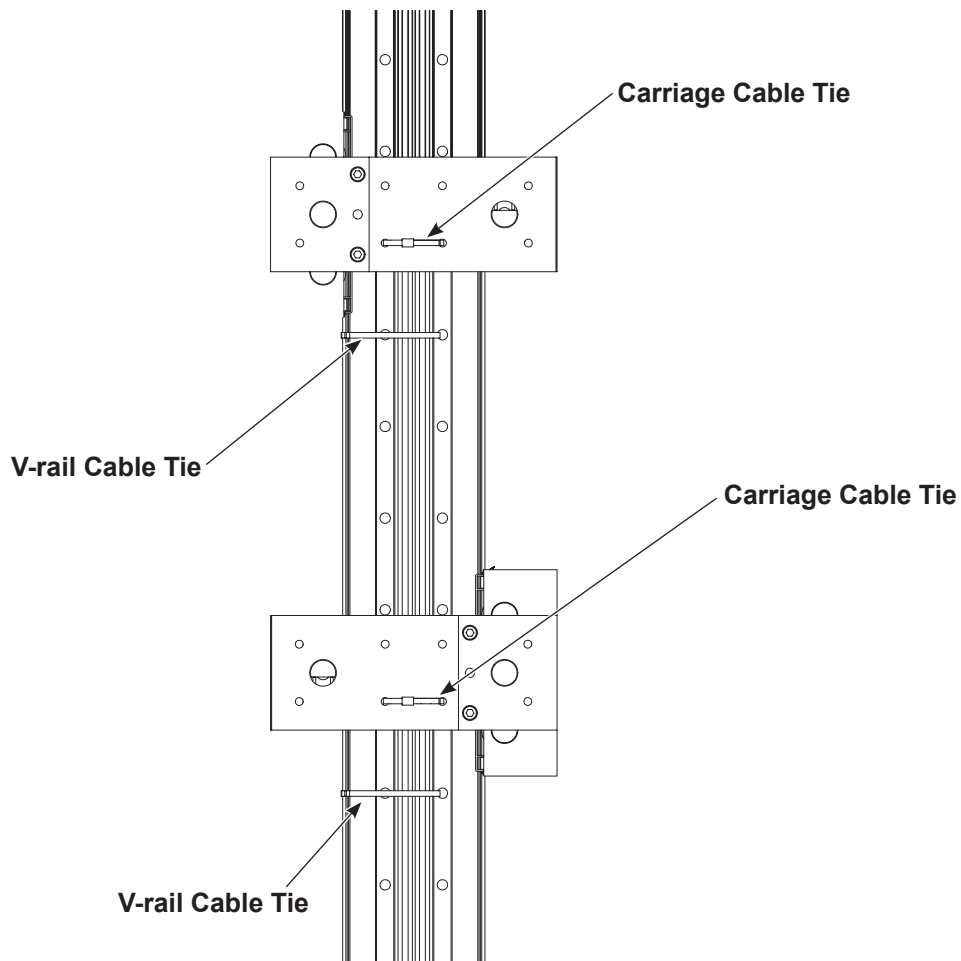


Figure 16 Removing Cable Ties from Carriage Assembly

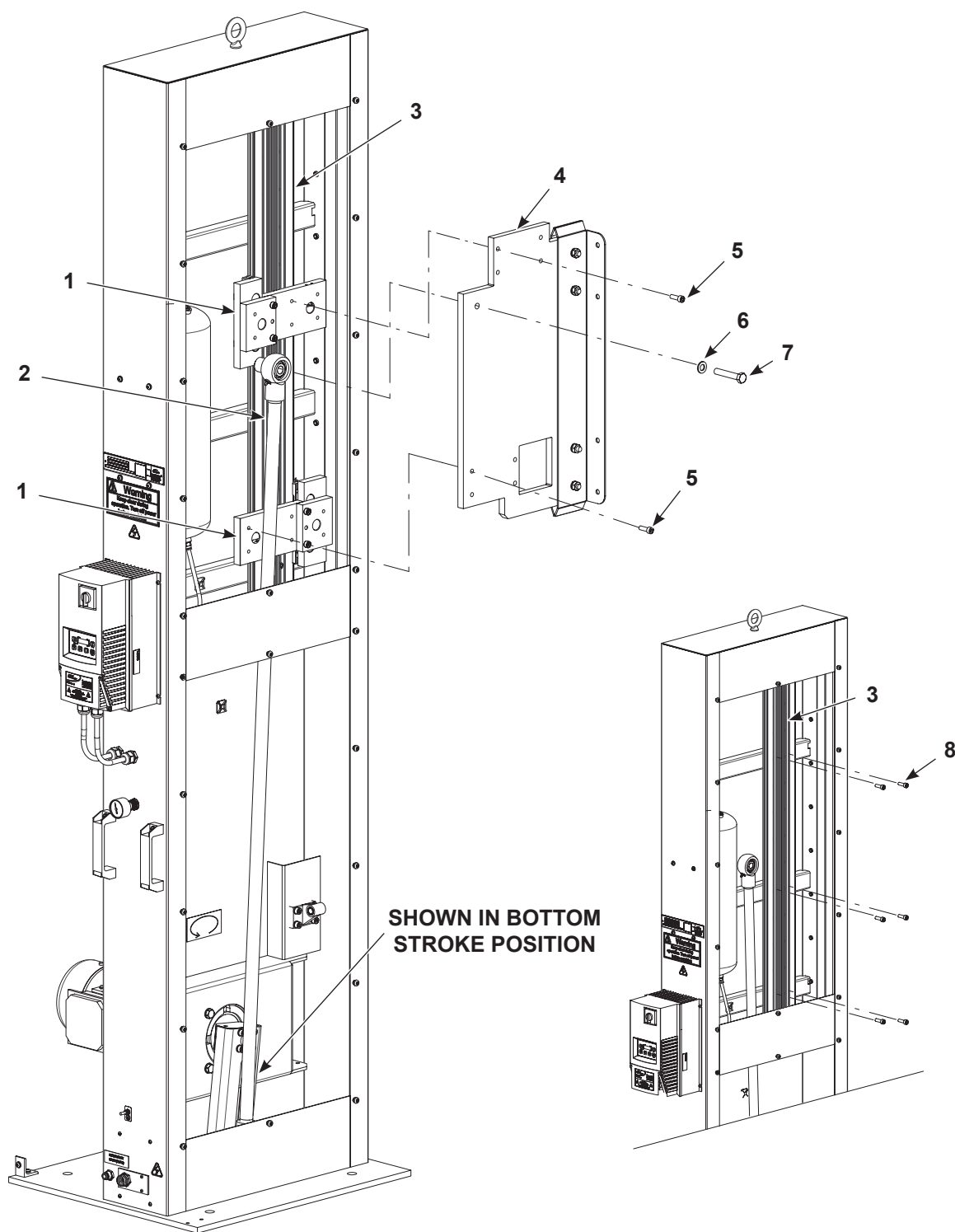


Figure 17 Installing the Carriage and Gun Mounting Plate Assemblies

- | | | |
|-------------------|--------------------------------|-------------------------|
| 1. Carriage | 4. Gun mounting plate assembly | 7. Connecting rod screw |
| 2. Connecting rod | 5. Gun plate screws | 8. V-rail screws |
| 3. V-rail | 6. Connecting rod washer | |

Install the Air Cylinder

1. See Figure 18. Move the gun mounting plate assembly (1) to the top stroke position. Use a block (2) as shown to secure the gun mounting plate assembly (1).
2. Install the upper part of the air cylinder (5) securing the rod end mount (10) to the gun mount plate (11) using two rod end mount screws (9).
3. Secure the lower part of the air cylinder by using the pin (7) and clips (6).
4. Connect the airline (3) to the air cylinder fitting (4).

NOTE: The gun mounting plate assembly needs to be guided down because it will drop down under its own weight.

5. Move the gun mounting plate assembly (1) to the bottom stroke position by carefully removing the block (2). The gun mounting plate assembly should drift downward.

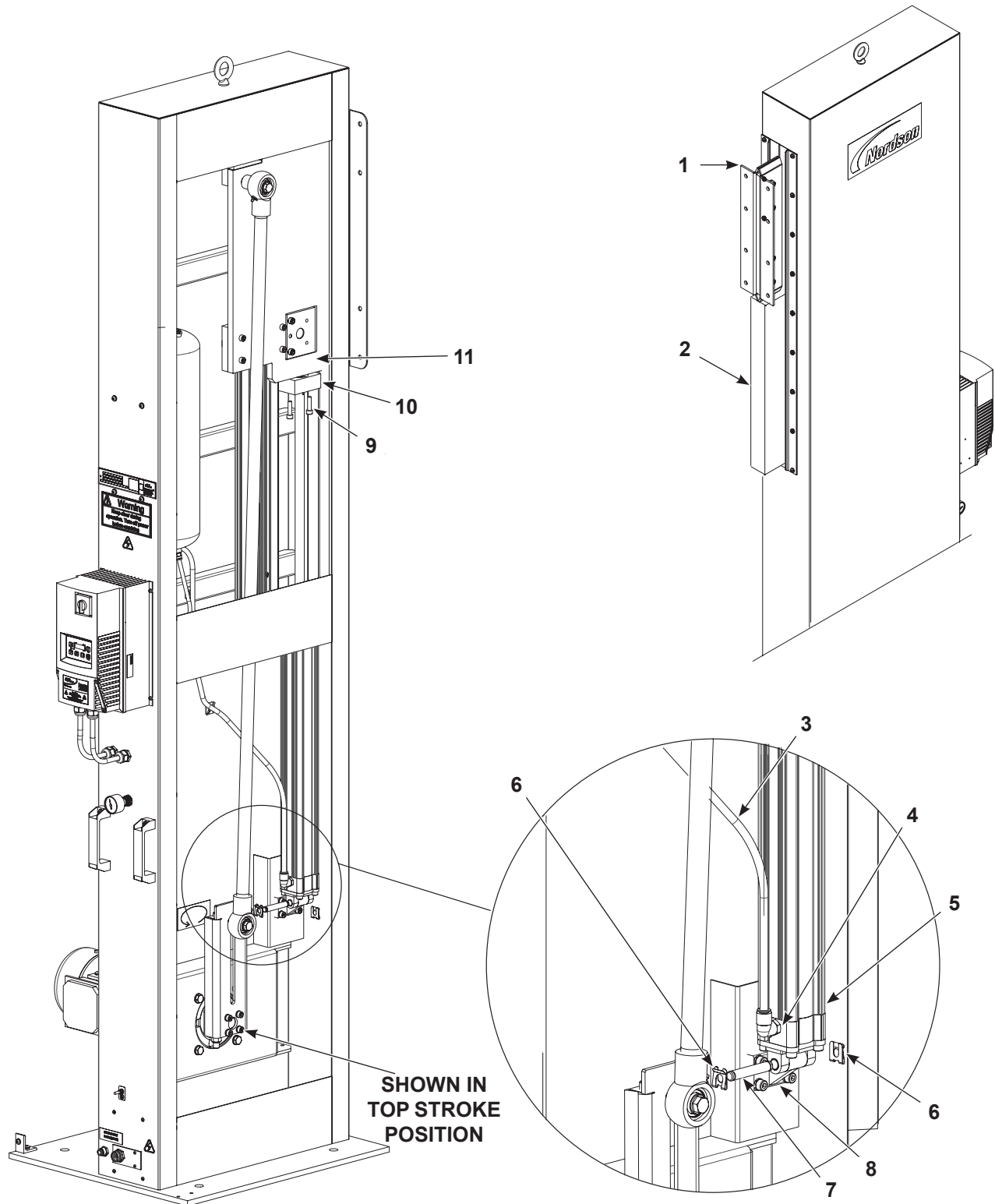


Figure 18 Installing the Air Cylinder

- | | | |
|--------------------------------|-----------------|-------------------------|
| 1. Gun mounting plate assembly | 5. Air cylinder | 9. Rod end mount screws |
| 2. Block | 6. Clips | 10. Rod end mount |
| 3. Air line | 7. Pin | 11. Gun mount plate |
| 4. Air cylinder fitting | 8. Bracket | |

Replace the Air Cylinder

1. Refer to the *Remove the Air Cylinder* section of page 30 to remove the air cylinder from the oscillator.
2. Perform the following:
 - a. Remove the air cylinder fitting (see Figure 18), breather vent (15), washer (14), Rod end mount (13), and lock nut (12) from the old air cylinder.
 - b. Install these parts onto the new air cylinder. Tighten the lock nut until it contacts the plate, then back it off 1/2 turn.
3. Install the new air cylinder (5) according to the *Install the Air Cylinder* section on page 36.

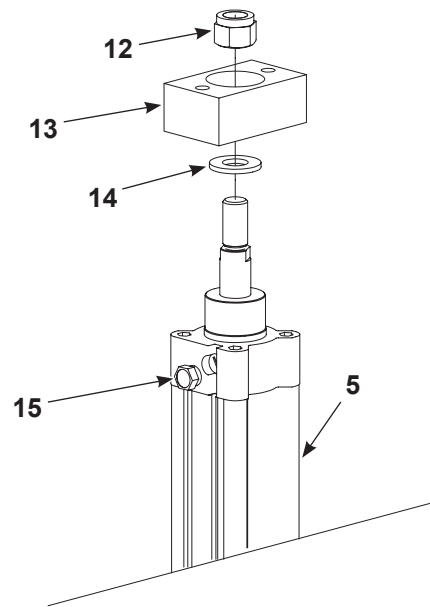


Figure 19 Installing the Air Cylinder

5. Air cylinder

12. Lock nut

13. Rod end mount

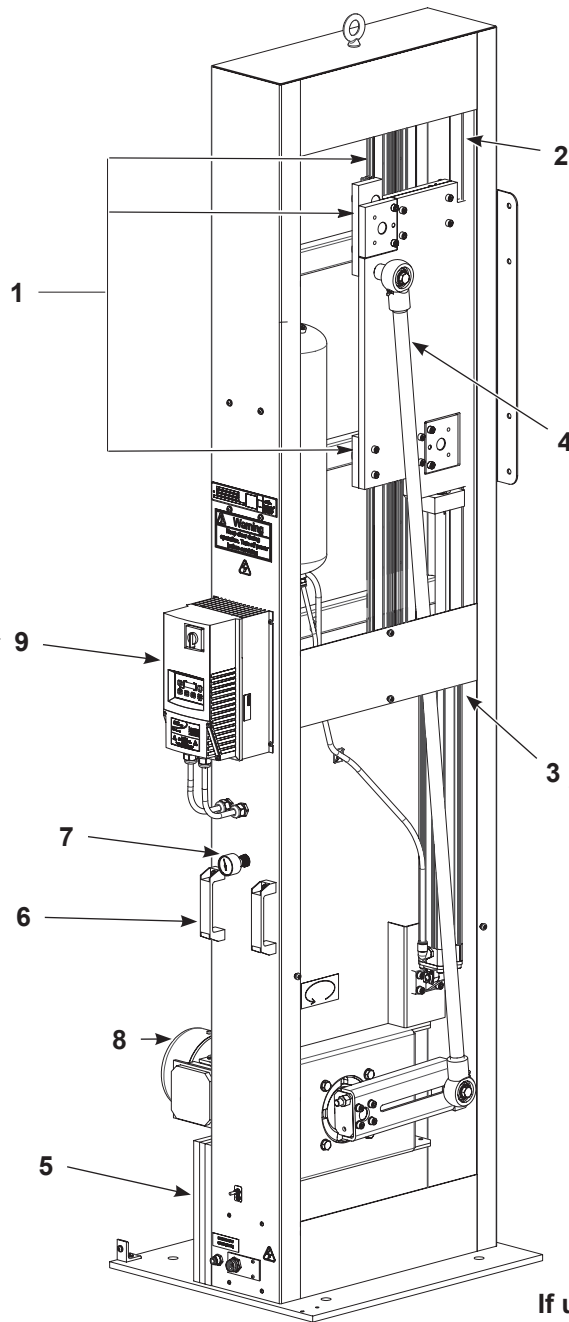
14. Flat washer

15. Breather vent

Parts

To order parts, call the Nordson Industrial Coating Customer Service Center at (800) 433-9319 or contact your local Nordson representative.

Parts listed in this manual are used on all oscillator models. For parts not listed in this manual, contact your Nordson representative or the Nordson Industrial Coating Customer Service Center.



If using a manual In/Out mover, order the Handle Kit for moving the oscillator.

Figure 20 Parts

Oscillator Assemblies

The following Oscillators are available.

Standard Capacity - 40 Kg

Part	Description
Oscillators Configured with VFD	
1601227	OSCILLATOR, NVO2, 380-415 V, 50/60 Hz, VFD
1601229	OSCILLATOR, NVO2, 380-415 V, 50/60 Hz, VFD, ATEX
1601231	OSCILLATOR, NVO2, 460 V, 50/60 Hz, VFD
1601175	OSCILLATOR, NVO2, 200-230 V, 50/60 Hz, VFD
1601233	OSCILLATOR, NVO2, 575/600 V, 50/60 Hz, VFD
Oscillators Configured without VFD	
1601235	OSCILLATOR, NVO2, 230/380-415 V, 50 Hz
1601237	OSCILLATOR, NVO2, 230/380-415 V, 50 Hz, ATEX
1601239	OSCILLATOR, NVO2, 230/460 V, 60 Hz
1601243	OSCILLATOR, NVO2, 575/600 V, 60 Hz
1601245	OSCILLATOR, NVO2, 200 V, 50 Hz

High Capacity - 80 Kg

Part	Description
Oscillators Configured with VFD	
1602381	OSCILLATOR, NVO2, 380-415 V, 50/60 Hz, VFD
1602382	OSCILLATOR, NVO2, 380-415 V, 50/60 Hz, VFD, ATEX
1602383	OSCILLATOR, NVO2, 460 V, 50/60 Hz, VFD
1602380	OSCILLATOR, NVO2, 200-230 V, 50/60 Hz, VFD
1602384	OSCILLATOR, NVO2, 575/600 V, 50/60 Hz, VFD
Oscillators Configured without VFD	
1602385	OSCILLATOR, NVO2, 230/380-415 V, 50 Hz
1602386	OSCILLATOR, NVO2, 230/380-415 V, 50 Hz, ATEX
1602387	OSCILLATOR, NVO2, 230/460 V, 60 Hz
1602389	OSCILLATOR, NVO2, 575/600 V, 60 Hz
1602390	OSCILLATOR, NVO2, 200 V, 50 Hz

Gear Motors

See Figure 20 and the following parts list

Item	Part	Description
8	1601248	GEAR MOTOR, 400 V-50 Hz
	1601254	GEAR MOTOR, 400 V-50 Hz, ATEX
	1601247	GEAR MOTOR, 230/460 V, 60 Hz
	1601177	GEAR MOTOR, 200 V, 50 Hz
	1601249	GEAR MOTOR, 575 V, 60 Hz

Inverters

See Figure 20 and the following parts list

Item	Part	Description
8	1106722	INVERTER DRIVE, 1 hp, disconnect, 200/240 V
	1106723	INVERTER DRIVE, 1 hp, disconnect, 400/480 V
	1106724	INVERTER DRIVE, 1 hp, disconnect, 480/600 V

Sensors

Item	Part	Description
Not Shown	1108645	SENSOR, inductive, proximity, 3-wire, NO, PNP, 18-mm

Kits

See Figure 20 and the following parts list

Item	Part	Description
1	1603137	KIT, RAIL, with dual carriage, NVO2, 80 kg
1	1603141	KIT, RAIL, with dual carriage, NVO2, 40 kg
2	1603138	KIT, FLAP SEAL, NVO2
3	1107802	KIT, AIR CYLINDER, 500-mm stroke, 50 mm diameter
4	1603139	KIT, DRIVE ROD AND ROD END SET, NVO2
5	1600187	KIT, COUNTERWEIGHT, 33.9 Kg. GBL oscillator
6	1104658	KIT, HANDLE, In/Out mover
7	1107803	KIT, REGULATOR, with gage, 0-100 psi, 1/8 NPT

Specifications

Refer to Table 4.

Table 4 Specifications

Hardware Specifications	
Power Supply	Refer to the part number descriptions in the Oscillator Assemblies section.
Motor	See motor identification plate
Enclosure	TEFC, IP55
Weight	210 kg (463 lb) without guns or mounting hardware
Operating Specifications	
Gun Speed Velocity Range	Minimum: 9 cycles per minute (up and down) @ 20 Hz Maximum: 40 cycles per minute (up and down) @ 88 Hz
Stroke Center Line from Base	1920 mm (75.6 in.) (Without in/out positioner)
Stroke Length Adjustment	100-450 mm (4-18 in.)
Maximum Payload	80 kg (176 lb) @ 610 mm (24 in.) from gun mounting flange 40 kg (88 lb) maximum for 40 kg units
Ambient Operating Temperature Range	5-50 °C (41-122 °F)
Dimensions	With VFD: 2427 mm H x 841 mm W x 676 mm D (95.6 in. H x 33 in. W x 26.6 in. D) Without VFD: 2427 mm H x 701 mm W x 676 mm D (95.6 in. H x 27.6 in. W x 26.6 in. D)
Recommended Gear Reducer Oil	Mineral oil with an EP additive (DIN51517, Type CLP, ISO viscosity, Grade EP220 (AGMA 5EP)
Compressed Air Requirements	
Supply Pressure	Minimum: 5.8 bar (85 psi) Maximum: 6.5 bar (94 psi)
Air Consumption	Negligible

Wiring Diagrams

See Figure 21, Figure 22, Figure 23 and Figure 24

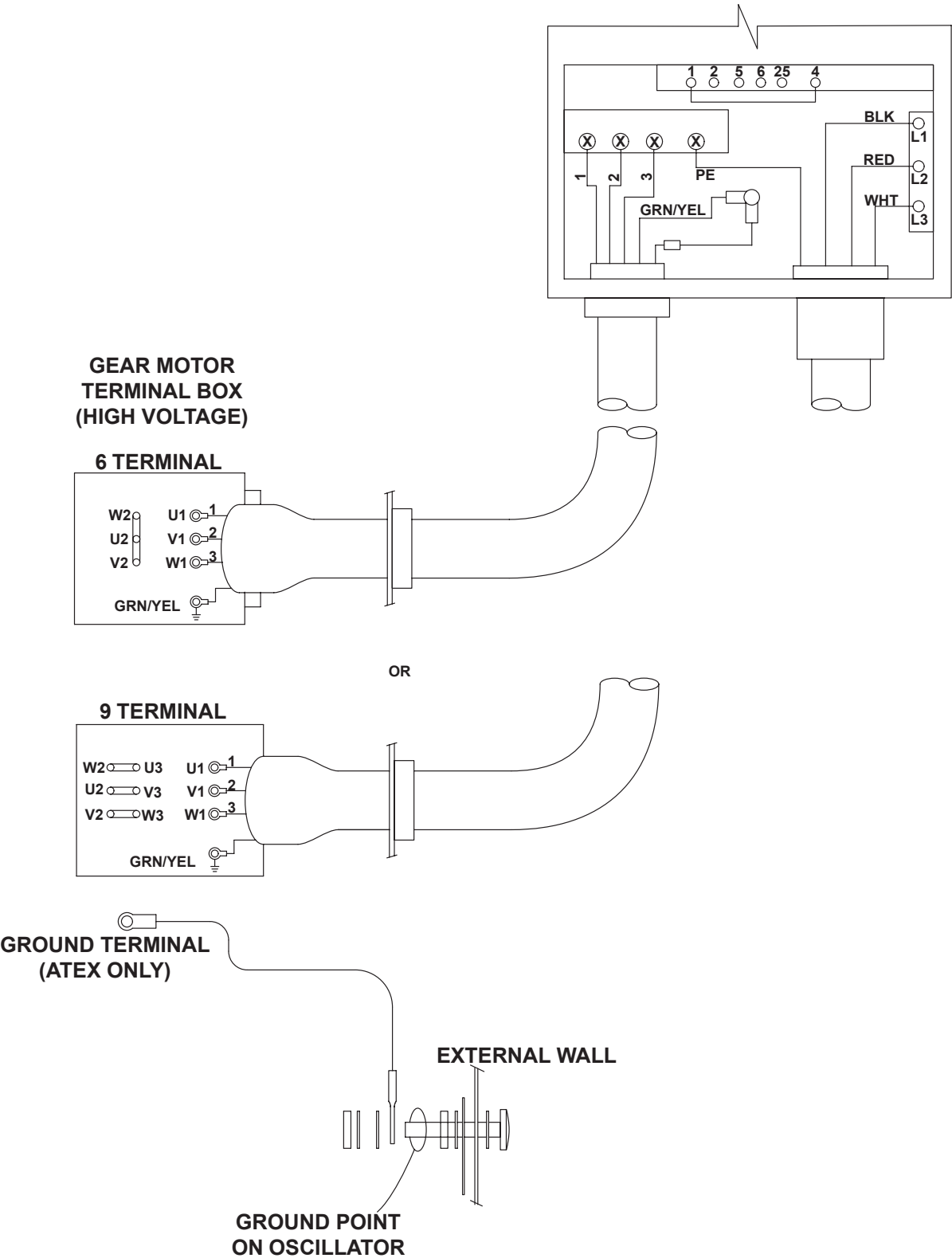


Figure 21 High Voltage Gear Motor with VFD

NOTE: The 6 and 9 terminal motors are interchangeable as long as the motor junction box is correctly wired and terminal jumpers are installed for the proper power supply voltage where the oscillators is installed

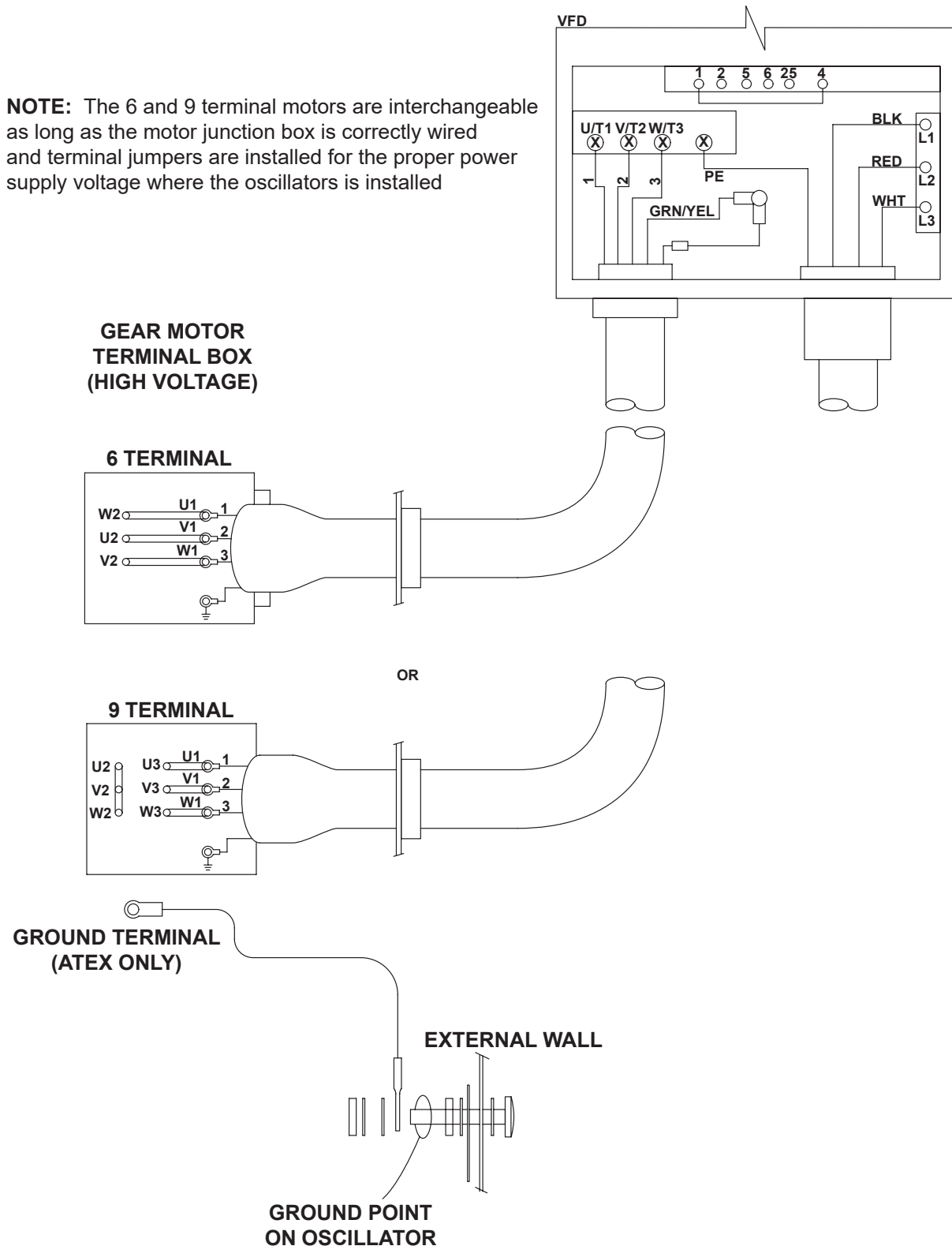


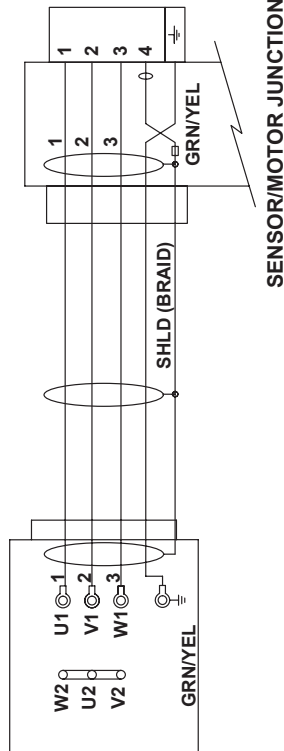
Figure 22 Low Voltage Gear Motor with VFD

3-PHASE OSCILLATOR MOTOR TO CONTROLLER CABLE
(NOT INCLUDED WITH THIS ASSEMBLY)

3-PHASE MOTOR WIRING DIAGRAM

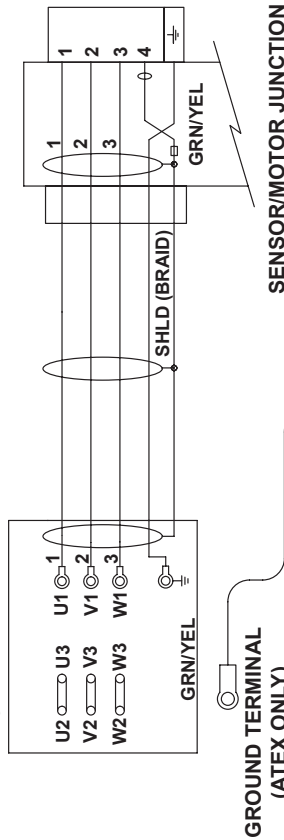
GEAR MOTOR
TERMINAL BOX
(HIGH VOLTAGE)

6 TERMINAL



SENSOR/MOTOR JUNCTION BOX

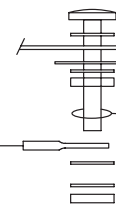
9 TERMINAL



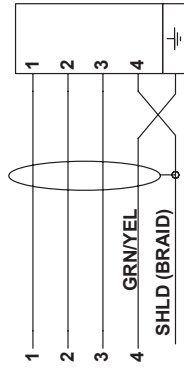
SENSOR/MOTOR JUNCTION BOX

GROUND TERMINAL
(ATEX ONLY)

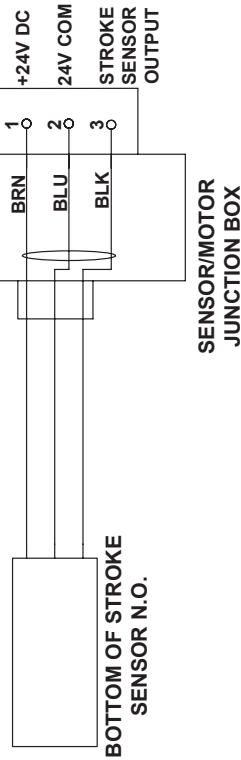
GROUND POINT ON
OSCILLATOR



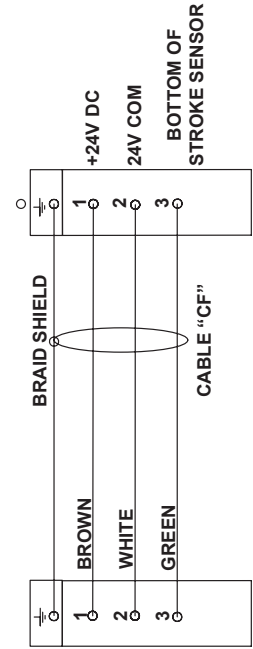
EXTERNAL WALL



SENSORS WIRING DIAGRAM



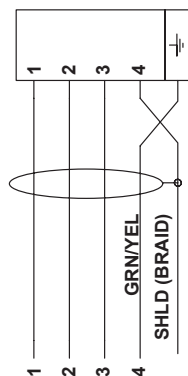
SENSOR TO CONTROLLER CABLE
(NOT INCLUDED WITH THIS ASSEMBLY)



NOTE: The 6 and 9 terminal motors are interchangeable as long as the motor junction box is correctly wired and terminal jumpers are installed for the proper power supply voltage where the oscillator is installed.

Figure 23 Wiring Diagram for Oscillators without VFD (High Voltage)

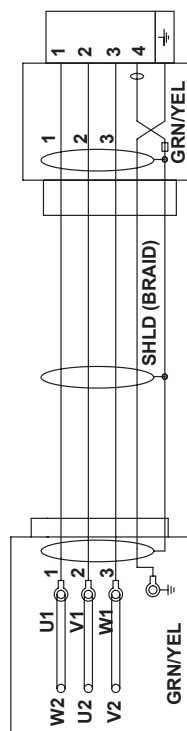
3-PHASE OSCILLATOR MOTOR TO CONTROLLER CABLE
(NOT INCLUDED WITH THIS ASSEMBLY)



3-PHASE MOTOR WIRING DIAGRAM

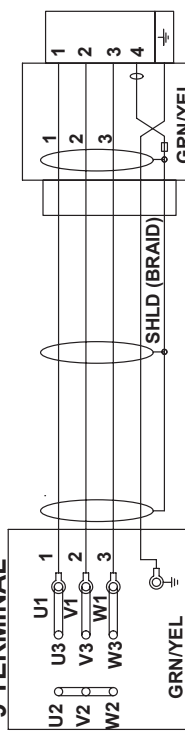
GEAR MOTOR
TERMINAL BOX
(LOW VOLTAGE)

6 TERMINAL



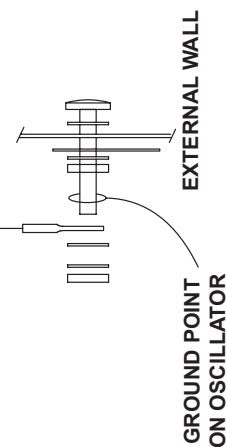
SENSOR/MOTOR JUNCTION BOX

9 TERMINAL

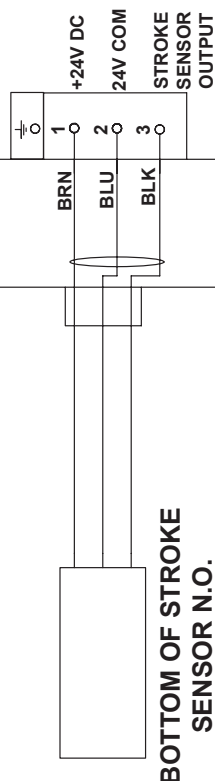


GROUND TERMINAL
(ATEX ONLY)

SENSOR/MOTOR JUNCTION BOX



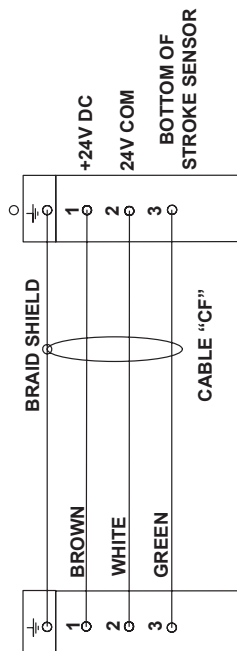
SENSORS WIRING DIAGRAM



BOTTOM OF STROKE
SENSOR N.O.

SENSOR/MOTOR
JUNCTION BOX

SENSOR TO CONTROLLER CABLE
(NOT INCLUDED WITH THIS ASSEMBLY)



NOTE: The 6 and 9 terminal motors are interchangeable as long as the motor junction box is correctly wired and terminal jumpers are installed for the proper power supply voltage where the oscillator is installed.

Figure 24 Wiring Diagram for Oscillators without VFD (Low Voltage)

EU DECLARATION of CONFORMITY

Product: Oscillator

Models: Oscillator ATEX standard version & ATEX VFD version (variable frequency drive)

Description: This is a machine for the movement of automatic spray guns while spraying.

Applicable Directives:

2006/42/EC - Machinery Directive

Standards Used for Compliance:

EN/ISO12100 (2010)

EN60204-1 (2018)

Type of Protection:

- Ambient Temperature: +5°C to +50°C



Date: **15OCT2024**

Jeremy Krone
Supervisor Product Development Engineering
Industrial Coating Systems
100 Nordson Drive
Amherst, Ohio, USA

Nordson Authorized Representative in the EU

Person authorized to compile the relevant technical documentation.

Contact: Operations Manager
Industrial Coating Systems
Nordson Deutschland GmbH
Heinrich-Hertz-Straße 42-44
D-40699 Erkrath



UK DECLARATION of Conformity

This Declaration is issued under the sole responsibility of the manufacture.

Product: Oscillator

Models: Oscillator ATEX standard version & ATEX VFD version (variable frequency drive)

Description: This is a machine for the movement of automatic spray guns while spraying.

Applicable UK Regulations

Supply Machinery Safety 2008

Standards Used for Compliance:

EN/ISO12100 (2010)

EN60204-1 (2018)

Type of Protection:

- Ambient Temperature: +5°C to +50°C

Principles:

This product has been manufactured according to good engineering practice.
The product specified conforms to the directive and standards described above.

Quality System DNV – ISO9001 Certified



Date: 15OCT2024

Jeremy Krone
Supervisor Product Development Engineering
Industrial Coating Systems
Amherst, Ohio, USA

Nordson Authorized Representative in the UK

Contact: Technical Support Engineer
Nordson UK Ltd.; Unit 10 Longstone Road
Heald Green; Manchester, M22 5LB.
England

