VO618N and VO624N Vertical Oscillators

Customer Product Manual
Part 1036659A02
Issued 12/09

For parts and technical support, call the Finishing Customer Support Center at (800) 433-9319.

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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.

Address all correspondence to:

Nordson Corporation
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Change Record

Revision	Date	Change
A03	9/09	Added solid crank arm version. Parts lists updated.

VO618N and VO624N Vertical Oscillators

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 persons operating or servicing equipment.

Qualified Personnel

Equipment 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.

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 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.
- While operating manual spray guns, make sure you are grounded. Wear electrically conductive gloves or a grounding strap connected to the gun handle or other true earth ground. Do not wear or carry metallic objects such as jewelry or tools.
- If you receive even a slight electrical shock, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.

Personal Safety *(contd)*

- Obtain and read Material Safety Data Sheets (MSDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- Make sure the spray area is adequately ventilated.
- 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.

High-Pressure Fluids

High-pressure fluids, unless they are safely contained, are extremely hazardous. Always relieve fluid pressure before adjusting or servicing high pressure equipment. A jet of high-pressure fluid can cut like a knife and cause serious bodily injury, amputation, or death. Fluids penetrating the skin can also cause toxic poisoning.

If you suffer a fluid injection injury, seek medical care immediately. If possible, provide a copy of the MSDS for the injected fluid to the health care provider.

The National Spray Equipment Manufacturers Association has created a wallet card that you should carry when you are operating high-pressure spray equipment. These cards are supplied with your equipment. The following is the text of this card:

WARNING: Any injury caused by high pressure liquid can be serious. If you are injured or even suspect an injury:

- Go to an emergency room immediately.
- Tell the doctor that you suspect an injection injury.
- Show him this card
- Tell him what kind of material you were spraying

MEDICAL ALERT—AIRLESS SPRAY WOUNDS: NOTE TO PHYSICIAN

Injection in the skin is a serious traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is a concern with some exotic coatings injected directly into the bloodstream.

Consultation with a plastic surgeon or a reconstructive hand surgeon may be advisable.

The seriousness of the wound depends on where the injury is on the body, whether the substance hit something on its way in and deflected causing more damage, and many other variables including skin microflora residing in the paint or gun which are blasted into the wound. If the injected paint contains acrylic latex and titanium dioxide that damage the tissue's resistance to infection, bacterial growth will flourish. The treatment that doctors recommend for an injection injury to the hand includes immediate decompression of the closed vascular compartments of the hand to release the underlying tissue distended by the injected paint, judicious wound debridement, and immediate antibiotic treatment.

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Ground all conductive equipment. Use only grounded air and fluid hoses. Check equipment and workpiece grounding devices regularly. Resistance to ground must not exceed one megohm.
- Shut down all equipment immediately if you notice static sparking or arcing. Do not restart the equipment until the cause has been identified and corrected.
- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Do not heat materials to temperatures above those recommended by the manufacturer. Make sure heat monitoring and limiting devices are working properly.

- Provide adequate ventilation to prevent dangerous concentrations of volatile particles or vapors. Refer to local codes or your material MSDS for guidance.
- Do not disconnect live electrical circuits when 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.
- Shut off electrostatic power and ground the charging system before adjusting, cleaning, or repairing electrostatic equipment.
- 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.

Halogenated Hydrocarbon Solvent Hazards

Do not use halogenated hydrocarbon solvents in a pressurized system that contains aluminum components. Under pressure, these solvents can react with aluminum and explode, causing injury, death, or property damage. Halogenated hydrocarbon solvents contain one or more of the following elements:

Element	Symbol	Prefix
Fluorine	F	“Fluoro-”
Chlorine	Cl	“Chloro-”
Bromine	Br	“Bromo-”
Iodine	I	“Iodo-”

Check your material MSDS or contact your material supplier for more information. If you must use halogenated hydrocarbon solvents, contact your Nordson representative for information about compatible Nordson components.

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 system electrical power. Close hydraulic and pneumatic shutoff valves and relieve pressures.
- Identify the reason for the malfunction and correct it before restarting the system.

Disposal

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

Description

Vertical oscillators are designed to move spray guns up and down in a smooth and repetitious pattern for thorough coverage of parts being coated. Two versions of the vertical oscillator are available:

- VO618N: 6-18 inch stroke length
- VO624N: 6-24 inch stroke length

In addition, vertical oscillators are also available with explosion-proof motors for use in liquid finishing systems. Speed control is accomplished internally through a variable sheave or externally by a VFD.

Table 1 Oscillator Speed Controls

Sheave	Function
Variable speed sheave	Stroke speed is manually controlled using a knob on the back of the oscillator cabinet. Motor sheaves separate to reduce diameter and stroke speed and close to increase diameter and stroke speed.
Fixed speed sheave	Stroke speed is controlled by a Variable Frequency Drive. Motor sheave diameter is fixed.

The osillators can support up to 12 automatic spray guns, depending on the weight of the guns. Refer to page 11 for Gun Loading charts.

The oscillator is typically mounted to either the floor or a horizontal in/out positioner, which moves the oscillator on- and off-line.

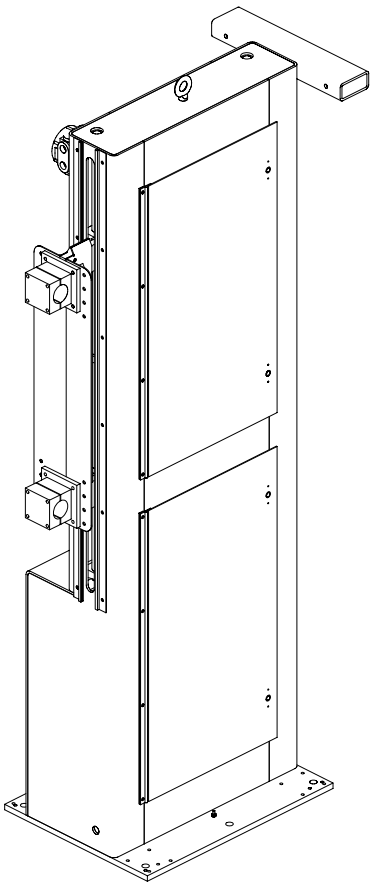

Figure 1 Oscillator

Oscillator Components

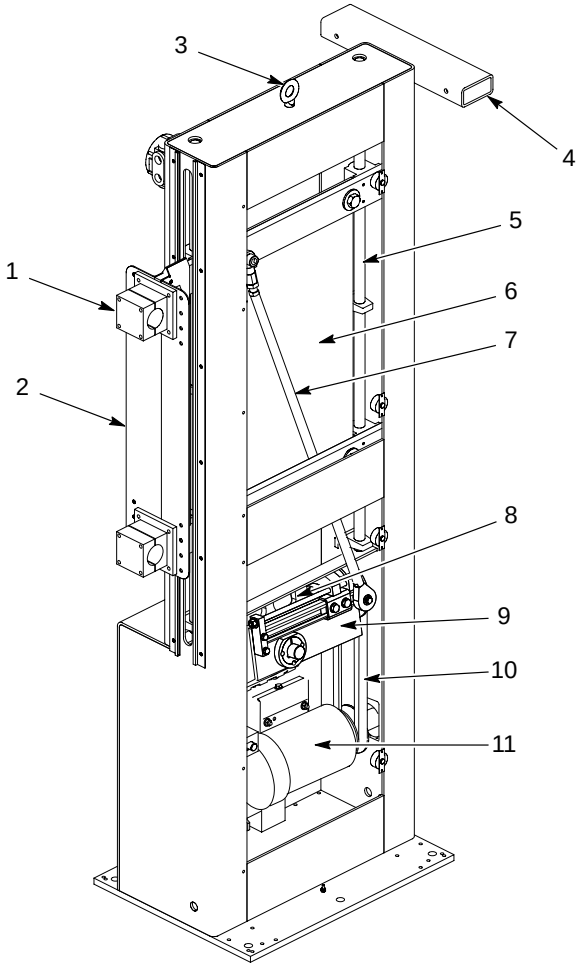

Figure 2 Typical Oscillator Components (Shown with access doors removed)

1. Gun bar clamps
2. Carriage
3. Eye bolt
4. Hose support bracket
5. Guide rods
6. Carriage plate
7. Connecting link
8. Gear reducer
9. Crank arm
10. Drive belt
11. Motor

The oscillator motor (11) is connected to the gear reducer (8) by a drive belt and sheaves. The gear reducer rotates the crank arm (9) which alternately pushes up or pulls down the connecting link (7) which is coupled to the crank arm and the carriage plate (6). If the oscillator is equipped with a variable motor sheave then a knob on the back of the oscillator is used to adjust the oscillator speed.

The gun bar clamps (1) are used to mount the gun bars on the carriage (2).

A stroke is a complete up and down cycle of the carriage. An optional proximity sensor mounted inside the cabinet senses when the carriage reaches the bottom of the stroke. When power to the oscillator is turned off, the carriage coasts to a stop at the bottom of the stroke.

The hose support bracket (4) is used to support spray gun hoses and cables so that they will not be damaged by the oscillator motion.

Installation

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

Reporting Damage

Inspect the oscillator before removing it from the pallet. Note any damage to the oscillator on the bill of lading and report it to the carrier.

If concealed damage is discovered while you are installing the oscillator, stop immediately and notify the carrier. Do not proceed until a carrier representative arrives to inspect the damage.

After removing the oscillator, make sure that all items listed on the packing slip are present. If an item listed on the packing slip is missing, note the missing item on the bill of lading and report the shortage to the carrier.

File a formal claim immediately with the carrier for any loss or damage. A notation on the bill of lading does not constitute notification of a claim. The following documents should be supplied to the carrier to support your claim:

- original freight bill
- original bill of lading
- copy of invoice or other evidence of value
- correspondence or photographs related to the claim
- concealed damage forms when necessary

NOTE: Nordson Corporation is willing to assist you in filing your claim and collecting for loss or damage. This willingness to assist you does not make Nordson Corporation responsible for collection of the claim or replacement of any loss.

Unloading and Connections

WARNING: Use approved and tested lifting equipment capable of lifting 635 kg (1400 lb) or more. Failure to observe this warning could result in property damage, injury, or death.

See Figure 2.

1. Remove the screws securing the shipping brackets to the pallet.
2. Attach lifting equipment to the eye bolt (3) and carefully lift the oscillator off the pallet.
3. Stand the oscillator upright on the floor or an in/out positioner. Secure the oscillator to the floor or in/out positioner.
4. Open the access doors and make sure no foreign material is present inside the oscillator cabinet that would jam or prevent smooth operation of the oscillator.
5. Check the gear reducer for proper oil level. Refer to Maintenance for the recommended oil. Make sure that the breather plug is installed in the gear reducer. If there is a pipe plug installed, replace it with the breather plug.

CAUTION: The sensor cable must be wired through an intrinsically safe barrier for Class 1, Division 1 environment.

6. Connect the 15-ft proximity sensor cable (if used) to the system controls, as required by the application.
7. Check the voltage of the oscillator motor (8). Make sure that the supply voltage matches the voltage of the motor.

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.

8. Connect a customer-supplied power cable between the motor junction box and a power supply:

Wire Color	Wire Function
Red	T1
Black	T2
Blue	T3
Orange	GND

9. Ground the oscillator, using the provided grounding lug, to a true earth ground. Test the ground and make sure it does not exceed local code requirements.
10. Mount the spray guns on the oscillator using appropriate gun mounting bars. Bundle the gun cables and hoses and hang them from hose support bracket (4), if used.
11. Close and secure the access doors.

Operation

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

WARNING: Before starting the oscillator, make sure nothing interferes with the gun bars or guns. Warn any personnel in the area to keep clear. Failure to observe this warning could result in property damage, injury, or death.

WARNING: Never open the access doors while the oscillator is operating. Failure to observe this warning may result in equipment damage or personal injury.

Stroke Adjustment

CAUTION: If stroke length is changed, carriage speed may have to be adjusted proportionally to prevent an over-speed condition. Maximum allowable carriage speed is 100 fpm.

CAUTION: Contact your Nordson representative before making adjustments to the connecting link. Failure to observe this caution may result in equipment damage.

Slide-Type Crank Arm

See Figure 3.

1. Disconnect and lock out electrical power to the oscillator.
2. Open the access doors.
3. Loosen the two $^{1}/_{2}$-in. hex head locking bolts (2).
4. Adjust the position of the clamp by turning the $^{7}/_{8}$-in. hex head adjusting screw (1).
   - **Shorter Stroke:** Turn the screw clockwise.
   - **Longer Stroke:** Turn the screw counterclockwise.
5. Tighten the two $^{1}/_{2}$-in. hex head locking bolts.
6. Check the gun carriage for any possible interference resulting from the new stroke length.

7. Remove all tools from the oscillator, close the access doors, and reconnect the power to the oscillator.
8. Test the new stroke length to make sure that parts going through the booth will be covered by the gun stroke.
9. Adjust the oscillator speed if necessary to accommodate the new stroke length. Refer to *Speed Adjustment* for instructions.

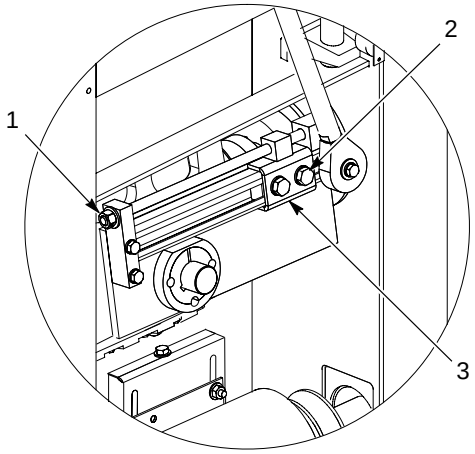

Figure 3 Stroke Adjustment - Slide-Type Crank Arm

1. Adjusting screw
2. Locking bolts
3. Adjusting clamp

Solid Crank Arm

See Figure 4.

1. Disconnect and lock out electrical power to the oscillator.
2. Open the access doors.
3. Take the weight off the connecting link by supporting the carriage from outside the cabinet.

WARNING: Extreme care must be taken to ensure that the carriage is supported securely so that the carriage cannot move when the connecting link is disconnected. Failure to observe this warning could result in personal injury.

NOTE: The crank arm has tapped holes spaced 1/2 inch apart. This spacing allows for 1/2 inch incremental adjustments in stroke length. Determine the correct stroke length needed before making your adjustment.

4. Remove the single bolt that connects the connecting link to the crank arm.
5. Apply a small amount of Loctite 262 to the both threads, then insert the bolt through the link bearing and into the selected crank arm hole. Tighten the bolt securely.

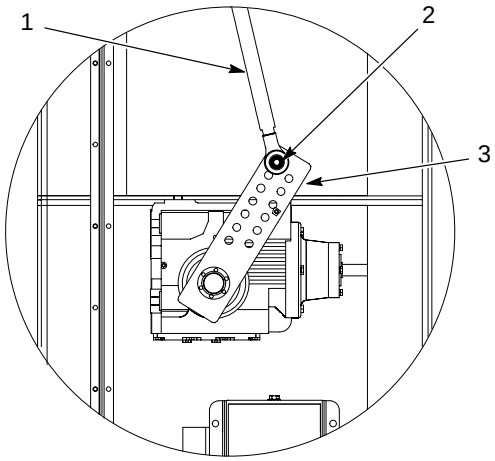

Figure 4 Stroke Adjustment - Solid Crank Arm

1. Connecting link
2. Bolt
3. Crank arm

6. Check the gun carriage for any possible interference resulting from the new stroke length.
7. Remove all tools from the oscillator, close the access doors, and reconnect the power to the oscillator.
8. Test the new stroke length to make sure that parts going through the booth will be covered by the gun stroke.
9. Adjust the oscillator speed if necessary to accommodate the new stroke length. Refer to *Speed Adjustment* for instructions.

Speed Adjustment

The oscillator must be operating while you adjust the speed. Measure the speed by counting the stroke cycles. One stroke cycle equals both the up and down motion.

CAUTION: The maximum allowable carriage speed is the lower of 100 feet per minute or 44 cycles per minute. Refer to the Carrige Speed-Stroke charts on the following pages.

Fixed-Sheave Oscillator

An oscillator with a fixed motor sheave requires a customer-supplied Variable Frequency Drive to control the speed of the oscillator.

Since the reducer is capable of overhauling, the VFD must be carefully selected to prevent damage to the oscillator.

Variable-Sheave Oscillator

See Figure 5. Turn the speed control knob (3) at the rear of the oscillator:

- **Increase Speed:** Turn the knob counterclockwise.
- **Decrease Speed:** Turn the knob clockwise.

NOTE: The torque arm (1) maintains the speed control knob (3) setting while the motor is operating.

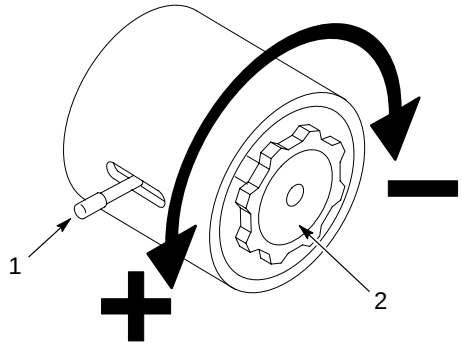

Figure 5 Speed Control (Variable Sheave Oscillators Only)

1. Torque arm
2. Speed control knob

Carriage Speed-Stroke Charts

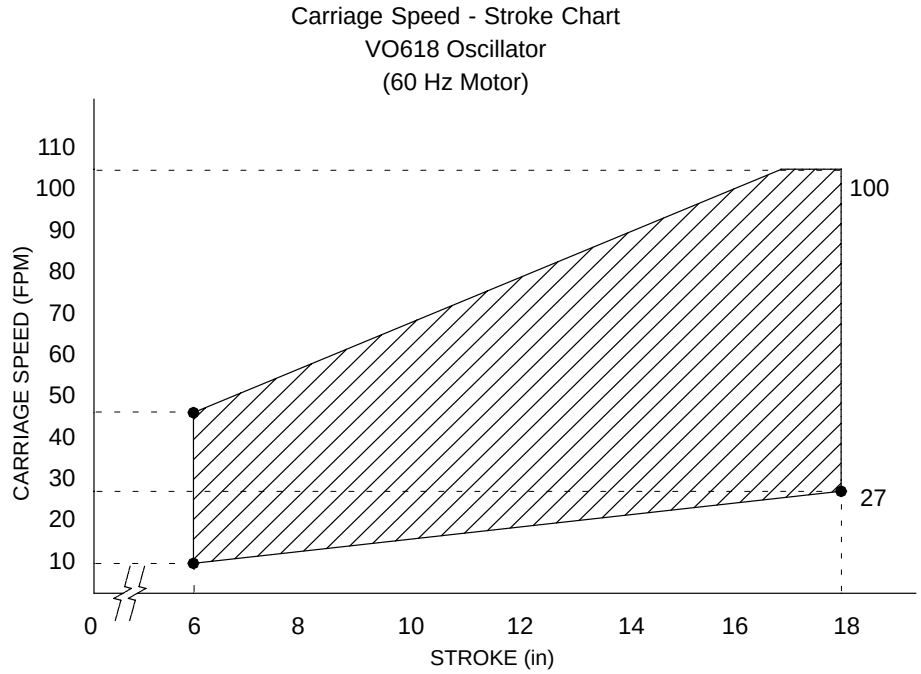

Figure 6 Carriage Speed/Stroke Chart for VO618 Oscillator

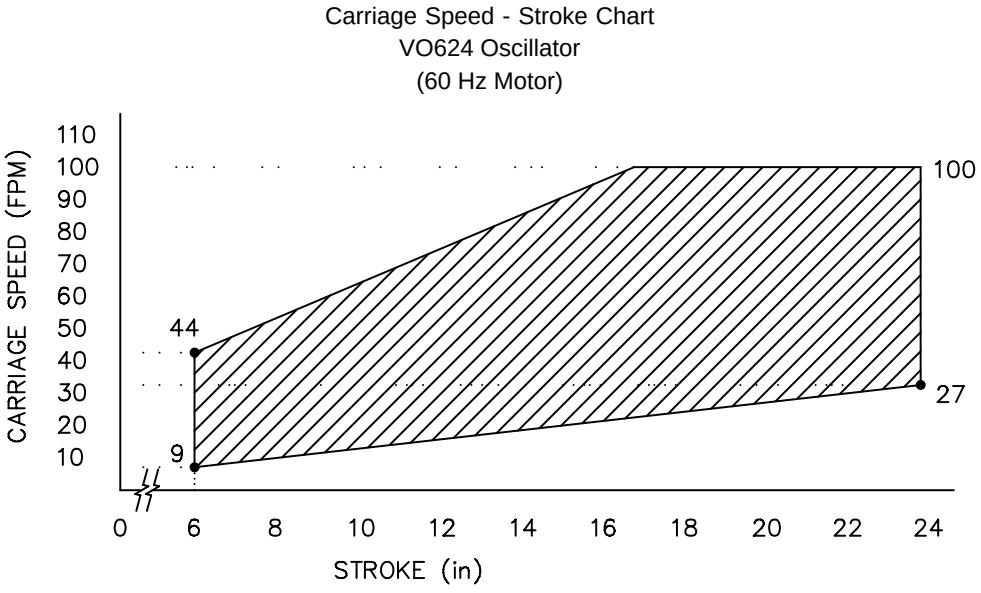

Figure 7 Carriage Speed/Stroke Chart for VO624 Oscillator

Maximum Gun Arm Loading

See Figures 8 and 9.

The vertical oscillator is designed to carry a maximum gun arm load of 113 kg (250 lb) at stroke lengths of up to 280 mm (11 in.). At stroke lengths exceeding 280 mm (11 in.), the maximum gun arm loading is proportionately reduced.

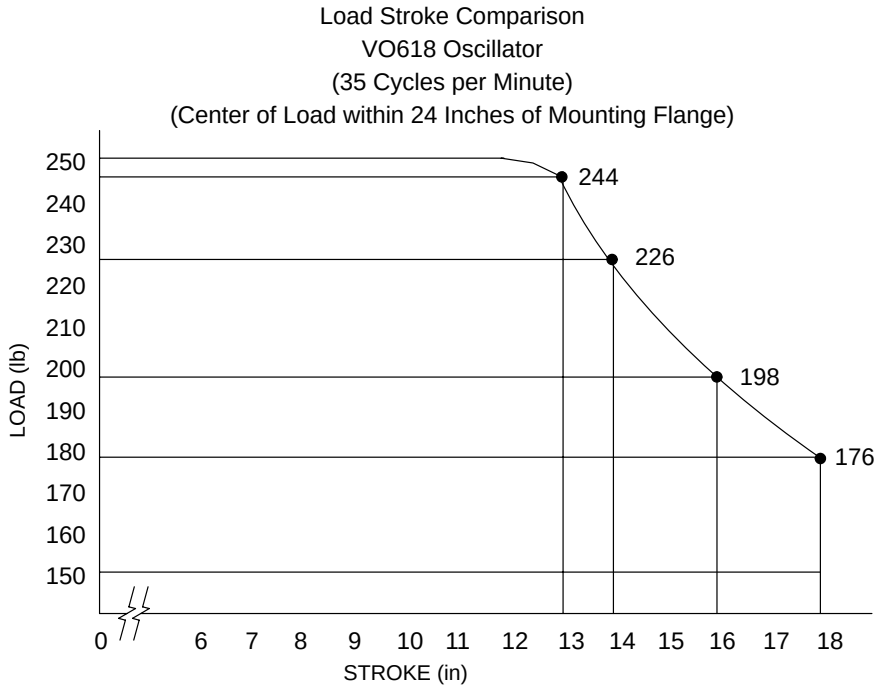

Figure 8 Load-Stroke Comparison at 35 Cycles per Minute for VO618 Oscillator

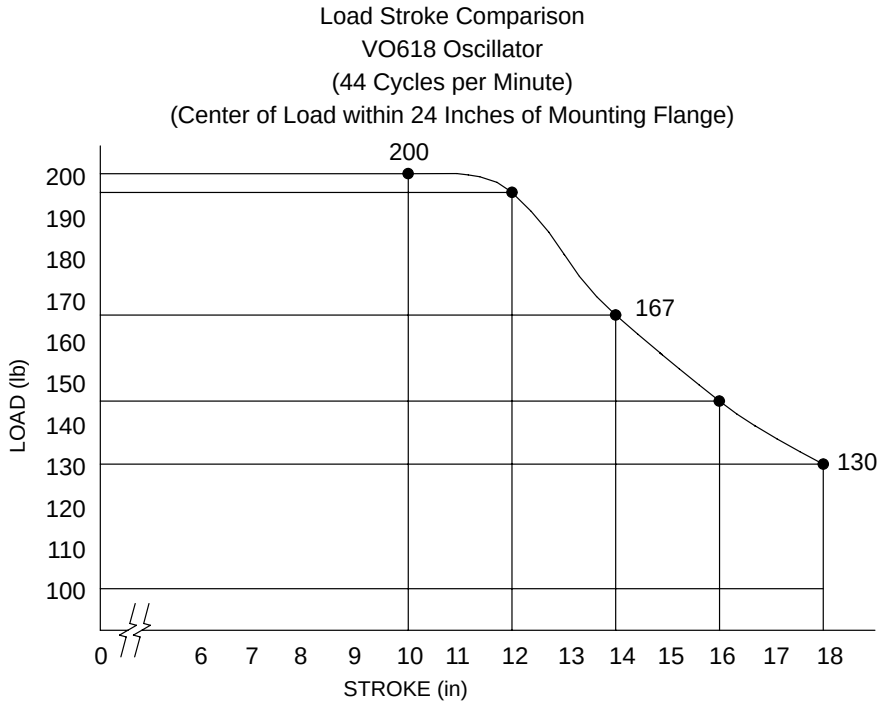

Figure 9 Load-Stroke Comparison at 44 Cycles per Minute for VO618 Oscillator

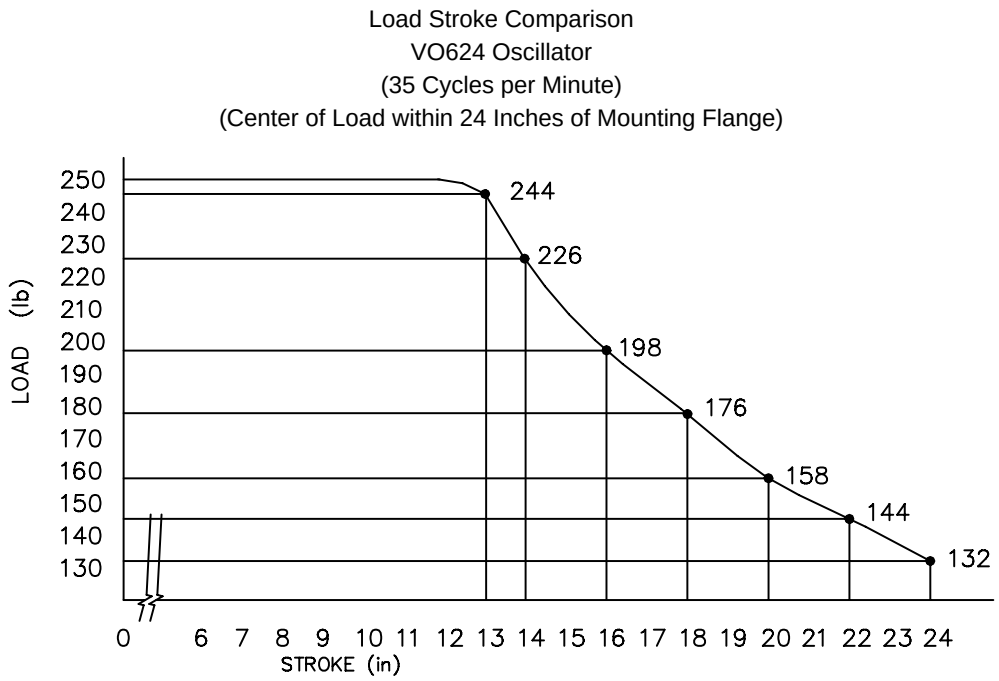

Figure 10 Load-Stroke Comparison at 35 Cycles per Minute for VO624 Oscillator

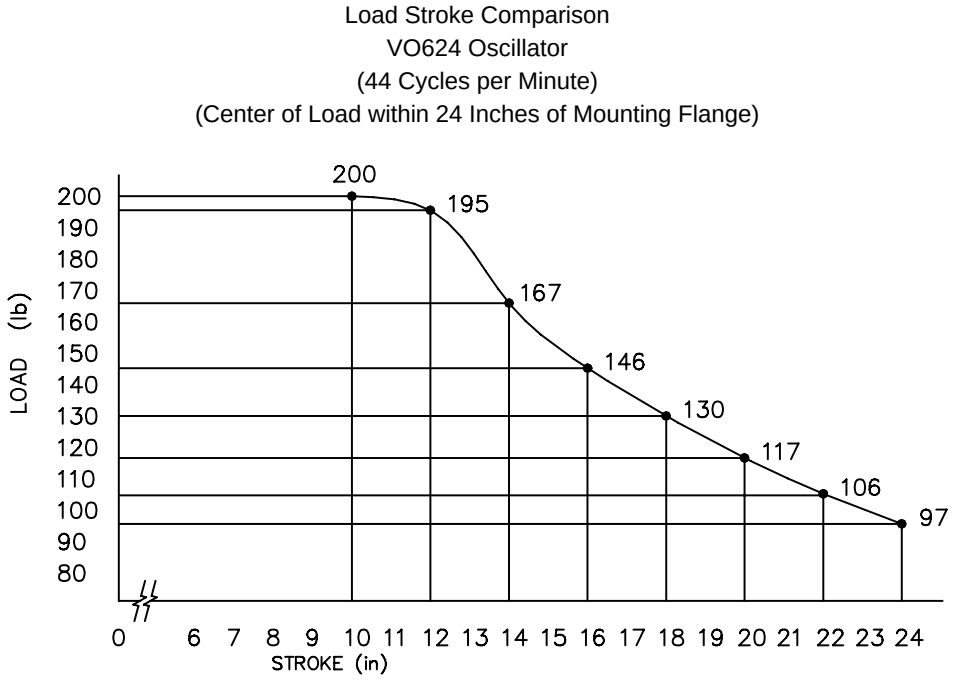

Figure 11 Load-Stroke Comparison at 44 Cycles per Minute for VO624 Oscillator

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.

Perform maintenance and lubrication procedures according to the recommended intervals. Refer to *Repair* for disassembly and rebuilding instructions.

Break-In Period

Refer to Table 2 and Figure 12 for maintenance procedures for the first 500 hours or five weeks (whichever comes first) of oscillator operation.

Table 2 Break-In Period Maintenance Schedule

Item	Description	Time Period	Procedure
4	**Gear Reducer**	Daily	Check the operating temperature. **Normal Operating Temperature:** Less than 80 °C (175 °F) **NOTE:** During the initial break-in period, temperatures may rise above 80 °C (175 °F). If this temperature is exceeded for more than 100 hours, contact your Nordson representative.
		First 500 hours/ five weeks in operation	Change the original oil. **NOTE:** The gear reducer requires 0.838 liter (0.885 quart) of synthetic worm gear oil (AGMA 7 or 8).
7	**Motor**	First 500 hours/ five weeks in operation	Check the motor current draw and compare the reading to the value on the motor nameplate.

Normal Operation Maintenance

Refer to Table 3 and Figure 12.

NOTE: Follow these procedures after the initial break-in period (which is 500 hours or five weeks, whichever comes first).

Table 3 Normal Operation Maintenance Schedule

Item	Description	Frequency	Procedure
—	**General Cleaning**	Daily	Clean the interior of the oscillator and lubricate all moving parts. Check for overspray build-up and slack in the drive belt. Clean and adjust the drive belt as necessary. **NOTE:** If the oscillator is located in an inherently dirty environment or if the overspray build up is excessive, consider installing a pressurizing unit. Oscillators with built-in pressurizing units are available. Contact your Nordson representative for more information.
4	**Gear Reducer**	Daily	Check the operating temperature. **Normal Operating Temperature:** Less than 80 °C (175 °F) **NOTE:** During the initial break-in period, temperatures may rise above 80 °C (175 °F). If this temperature is exceeded for more than 100 hours, contact your Nordson representative.
		Weekly	Check for oil leaks and correct as needed.
		10000 hours/two years	Change the oil. **NOTE:** The gear reducer requires 0.838 liter (0.885 quart) of synthetic worm gear oil (AGMA 7 or 8).
7	**Motor**	Weekly	Clean the grille over the fan on the rear of the motor. Make sure that it is clear of any dirt buildup.
1, 3	**Gun Carriage Guide Rods and Bearings**	Weekly	Wipe overspray off the guide rods and lubricate the linear bearings with a high-quality, lithium-based, multipurpose grease.
		Monthly	Inspect the guide rods for excessive or abnormal wear. Evidence of deep grooves indicate that the linear bearings or guide rods are out of alignment.
2, 5	**Connecting Link and Rod End Bearing**	Weekly	Lubricate with a high-quality, lithium-based, multipurpose grease.
8	**Crank Arm**	Monthly	Check the tightness of all screws and nuts. Tighten as required.
6	**Drive Belt**	Monthly	Inspect for cracks and fraying. Replace the drive belt as necessary.

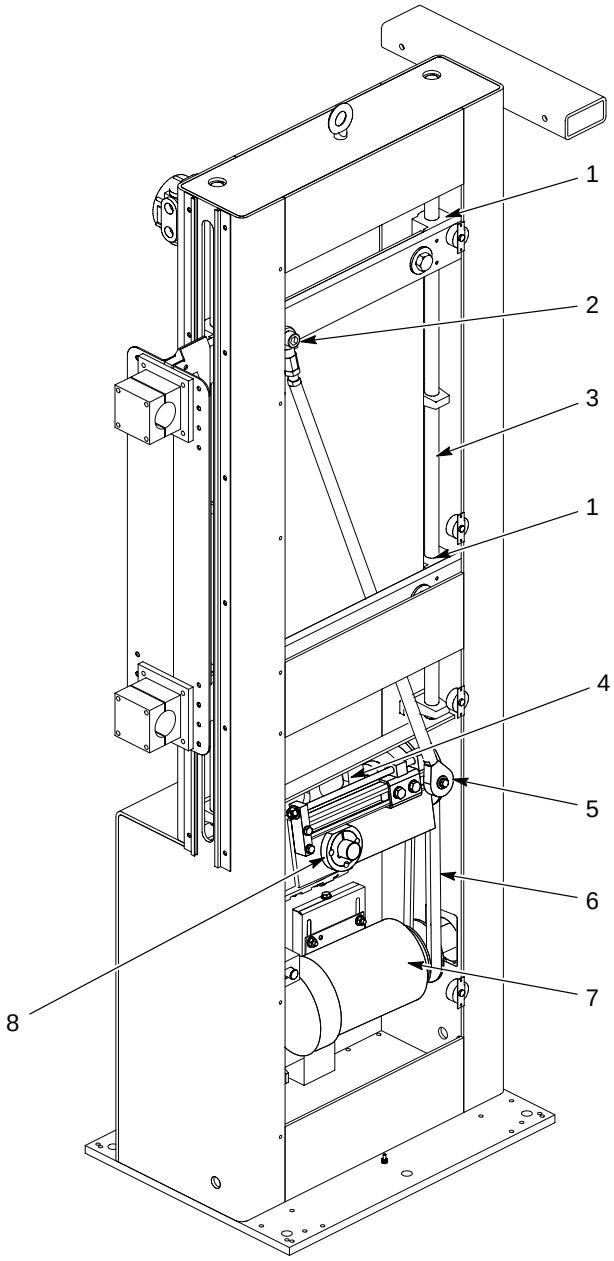

Figure 12 Maintenance Points

1. Linear bearings
2. Rod end bearings
3. Guide rods
4. Gear reducer
5. Connecting link
6. Drive belt
7. Motor
8. Crank arm

Troubleshooting

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

This section contains troubleshooting procedures. These procedures cover only the most common problems that you may encounter. If you cannot solve the problem with the information given here, contact your local Nordson representative for help.

Problem	Possible Cause	Corrective Action
1. Excessive vibration	Defective gun carriage guide rods and support blocks	Check for excessive guide rod wear. Replace the guide rods if necessary. Check the alignment of the support blocks. Adjust the support blocks if necessary. Lubricate the carriage linear bearings. Check for missing balls in the linear bearings.
	Low oil level in gear reducer	Check for proper oil level.
	Worn sheaves	Check the condition of the drive belt. Replace the drive belt if necessary. Verify that the sheaves are securely fastened to the motor and gear reducer shafts. Check the sheaves for any wear or damage. Replace any worn and/or defective parts as necessary.
	Loose crank arm	Check the lock-down bolts on the crank arm.
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.

Continued...

Problem	Possible Cause	Corrective Action
2. Oscillator will not start *(contd)*	Blocked gear reducer	Verify that the gear reducer is operating properly. Make sure that the output shaft moves freely and does not bind. Check the oil level in the gear reducer. Add oil as necessary.
	Worn sheaves	Check the condition of the drive belt. Replace the drive belt if necessary. Make sure that the sheaves are securely fastened to the motor and gear reducer. Check the sheaves for wear or damage. Replace defective and/or worn parts if necessary.
	Variable-sheave oscillators only: Speed control knob too tight	If the motor is humming but not turning, turn the speed control knob clockwise until the oscillator starts. Adjust the oscillator to the proper speed after it starts.
3. Speed changes by itself	Loose set screw on motor sheave	Contact your Nordson representative.

Repair

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

WARNING: Disconnect and lock out power to the oscillator before servicing. Failure to observe this warning may result in personal injury.

Drive Belt Replacement

WARNING: Be sure that the gun carriage is securely supported before proceding. Failure to observe this warning may cause the carriage to slip, causing property damage, personal injury, or death.

Removing the Drive Belt

NOTE: Use the appropriate procedure based on the type of oscillator you have (variable-speed or fixed-speed sheave).

Variable-Sheave Oscillator

1. See Figure 13. Start the oscillator. While the oscillator is operating, turn the speed control knob (3) clockwise as far as possible. This will cause the drive belt (2) to loosen.
2. Shut off the oscillator. Disconnect and lock out oscillator power.
3. Open the access doors.
4. Support the gun carriage by placing 5 x 10 cm (2 x 4 in.) pieces of wood between the bottom of the carriage plate and the bottom of the upper door frame.
5. Remove the torque arm from the speed control knob.
6. Mark the location of the motor (5) mounting bolts on the motor mounting bracket. You will use this mark as a reference when installing the motor.
7. Remove the screws and nuts securing the motor to the motor bracket.
8. Carefully lift the motor to remove the drive belt, then remove the motor from the oscillator and set it aside.
9. Remove the drive belt from the sheaves (3, 6).

NOTE: It may be necessary to pry the drive belt off the sheaves.

Fixed-Sheave Oscillator

1. See Figure 13. Shut off the oscillator. Disconnect and lock out oscillator power.
2. Open the access doors.
3. Support the gun carriage by placing 5 x 10 cm (2 x 4 in.) pieces of wood between the bottom of the carriage plate and the bottom of the upper door frame.
4. Loosen the motor bracket adjusting screw (6) to relieve tension in the drive belt (2).
5. Remove the drive belt from the sheaves (1, 4).

NOTE: It may be necessary to pry the drive belt off the sheaves.

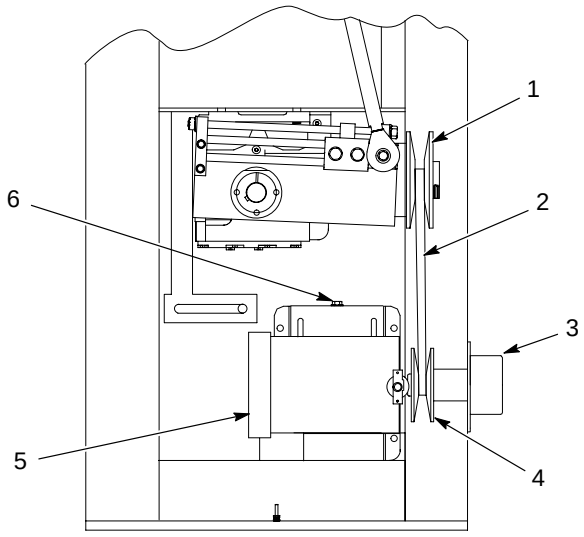

Figure 13 Drive Belt Replacement

1. Gear reducer sheave
2. Drive belt
3. Speed control knob
4. Motor sheave
5. Motor
6. Adjusting screw

Installing the Drive Belt

Variable-Sheave Oscillator

1. See Figure 13. Install a new drive belt (2) on the gear reducer sheave (1).
2. Carefully lift the motor (5) into place and slide the drive belt onto the motor sheave (4).

NOTE: Make sure that the faces of the sheaves are parallel before tightening the motor mounting bolts.

3. Align the motor in its previous location on the motor bracket. Secure the motor using the screws and nuts.
4. Install the torque arm onto the speed control knob (3).
5. Remove the wood block supporting the carriage plate.
6. Connect power and start the oscillator.
7. Turn the speed control knob counterclockwise to tighten the drive belt.
8. Check the drive belt while the oscillator is operating.
9. Adjust the oscillator speed as necessary.

Fixed-Sheave Oscillator

1. See Figure 13. Install the new drive belt (4) onto the gear reducer and motor sheaves (1, 4).
2. Position the motor so that the belt will deflect no more than $^1/_4$ in. Tighten the motor bracket adjusting screw (6).
3. Remove the wood block supporting the carriage plate.
4. Connect power and start the oscillator.
5. Check the drive belt while the oscillator is operating.
6. Adjust the oscillator speed as necessary.

Gun Carriage Linear Bearing and Guide Rod Replacement

CAUTION: Replacement and adjustments of the gun carriage bearings and guide rods is a procedure requiring great precision. It is best accomplished by a trained and authorized Nordson technician.

See Figure 14.

1. Turn off and lock out power to the oscillator.
2. Open the access doors.

WARNING: Be sure that the gun carriage is securely supported before proceding. Failure to observe this warning may cause the carriage to slip, causing property damage, personal injury, or death.

3. Support the carriage plate (4) from the outside of the cabinet to take the weight off the linear bearing blocks (1).

CAUTION: Remove the guide rod assemblies one at a time. Do not remove both assemblies simultanously. Removing both guide rod assemblies will leave nothing to support the carriage plate from inside the oscillator.

4. Remove one guide rod assembly using the following procedure:
   a. Remove the bolts and nuts securing both linear bearing blocks to the carriage plate. Note the locations of any shims or spacer blocks, and save them for reuse.

   NOTE: There are three shaft support blocks on each guide rod.

   b. Remove the bolts securing the shaft support blocks (3) to the oscillator cabinet. Note the locations of any shims and save them for reuse.
   c. Remove the guide rod (2) with the three shaft support blocks and two linear bearings attached.
   d. Loosen the shaft support blocks and slide them off the guide rod. Slide the linear bearings off the guide rod.

CAUTION: Use caution when installing the guide rods. If not installed properly, the support blocks can scratch the guide rods.

5. Slide the new linear bearing and shaft support blocks onto the new guide rod, but do not tighten the shaft support blocks at this time. Make sure to have one linear bearing on each side of the center support block as illustrated.
6. Install the guide rod assembly into the oscillator using the following procedure:
   a. Secure the support blocks to the oscillator frame. Be sure to install any shims that you removed.
   b. Tighten the shaft support blocks to the guide rod.

CAUTION: The linear bearings must not apply any force to the guide rod. Premature wear will occur if the linear bearings are not perpendicular to the guide rod.

   c. Secure each linear bearing block to the carriage plate. Be sure to install any shims that you removed.
7. Repeat steps 4 and 5 to replace the other guide rod and linear bearings.
8. Remove the supports from the gun carriage.
9. Manually check the carriage stroke cycle by either lifting and lowering the gun carriage or turning the drive belt by hand. If binding occurs, inspect and adjust the following components and recheck the carriage stroke.
   - **Guide Rods:** Make sure the guide rods are parallel to each other. If they are not parallel, shim under the support blocks as necessary.
   - **Linear Bearings:** Make sure the linear bearings are not applying any force to the guide rods. If they are applying force, adjust the bearing shims or slot spaces as necessary.
10. Remove all tools from the oscillator, close the access doors, and start the oscillator. Make sure the carriage is moving smoothly.

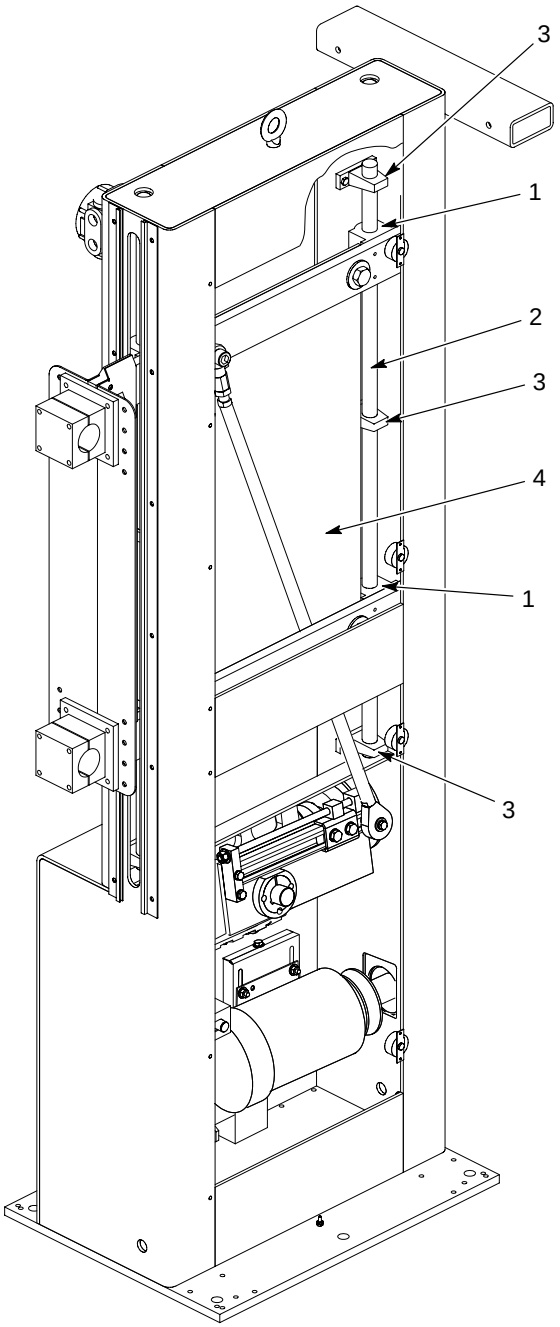

Figure 14 Gun Carriage Linear Bearing and Guide Rod Replacement

1. Linear bearing block
2. Guide rod
3. Shaft support block
4. Carriage plate

Gear Reducer Replacement

WARNING: Do not make adjustments to the connecting link. Failure to observe this warning may cause the carriage plate to crash into the guide rod support blocks, causing property damage, personal injury, or death.

Removing the Gear Reducer

See Figure 15.

1. Stop the oscillator at the highest point of the stroke to provide the maximum amount of room to work.
2. Disconnect and lock out power to the oscillator.

WARNING: Be sure that the gun carriage is securely supported before proceding. Failure to observe this warning may cause the carriage to slip, causing property damage, personal injury, or death.

3. Place a support 2.5 cm (1 in.) below the carriage and lower the carriage onto the support. The 2.5-cm (1-in.) space facilitates assembly of the carriage drive components.

NOTE: The carriage can be supported by securing two-piece 2.5-cm (1-in.) bore clamp collars on the carriage guide rods (2) below the bearing blocks on each guide rod assembly.

4. Remove the connecting link (3) from the crank arm assembly (9).

NOTE: Measure the distance from the gear reducer housing to the back of the crank arm. You will need this measurement when you install the crank arm onto the new gear reducer.

5. Remove the crank arm assembly by following one of these procedures:

Slide-Type Crank Arm Removal

a. Remove the two set screws in the crank arm hub (10). Note that there is one tapped hole in the hub without a set screw.

b. Install one of the set screws that you just removed into the empty tapped hole in the hub. Tighten the set screw to pry the crank arm off of the gear reducer shaft.

c. After installing the set screw as far as possible, pry off the crank arm.

Solid Crank Arm Removal

a. To remove the crank arm hub, remove the socket head screws holding the concentric clamping device. Note that there are 5 threaded holes without screws installed.

b. Install 5 screws into the empty tapped holes. Alternately tighten the screws to pry the crank arm off the reducer shaft.

c. After installing the screws as far as possible, pry off the crank arm.

6. Loosen the motor mounting bolts to slide the motor (7) up and remove the drive belt (5) from the gear reducer sheave (4).

NOTE: It may be necessary to pry the drive belt off of the sheave.

WARNING: The gear reducer weighs approximately 23 kg (50 lb). Use caution when removing the gear reducer from the oscillator.

7. Loosen the four bolts and remove the gear reducer.

NOTE: Measure the distance from the gear reducer housing to the rear of the gear reducer sheave. You will need this measurement when you install the sheave onto the new gear reducer.

8. Remove the gear reducer sheave from the gear reducer.

Installing the Gear Reducer

See Figure 15.

1. Install the gear reducer sheave (4) onto the new gear reducer (8). Position the sheave on the shaft in the same location as it was on the old gear reducer.

NOTE: Make sure the gear reducer and motor sheaves (4, 6) are parallel before you tighten the gear reducer bolts. There should be approximately 14 in. between the centers of the gear reducer and motor shafts.

2. Install the new gear reducer (8) and secure it with the four bolts.
3. Variable-speed sheave: Turn the control knob clockwise to the minium speed position.

4. Install the drive belt on the sheaves and position the motor if needed so that the pulleys are parallel. With fixed-speed sheaves the belt should deflect no more than 6.3 mm ($^1/_4$ in.) Tighten the motor mounting bolts.
5. Install the crank arm assembly onto the gear reducer shaft. Position the crank arm on the shaft in the same location as it was on the old grear reducer.
6. Attach the connecting link to the crank arm assembly. Make sure that the connecting link is parallel with the carriage plate assembly.
7. Remove the carriage plate supports.

NOTE: Make sure that the breather plug is installed in the new gear reducer. If there is a pipe plug installed, remove the breather plug from the old gear reducer and install it in place of the pipe plug.

8. Remove all tools from the oscillator.
9. Connect power to the oscillator.

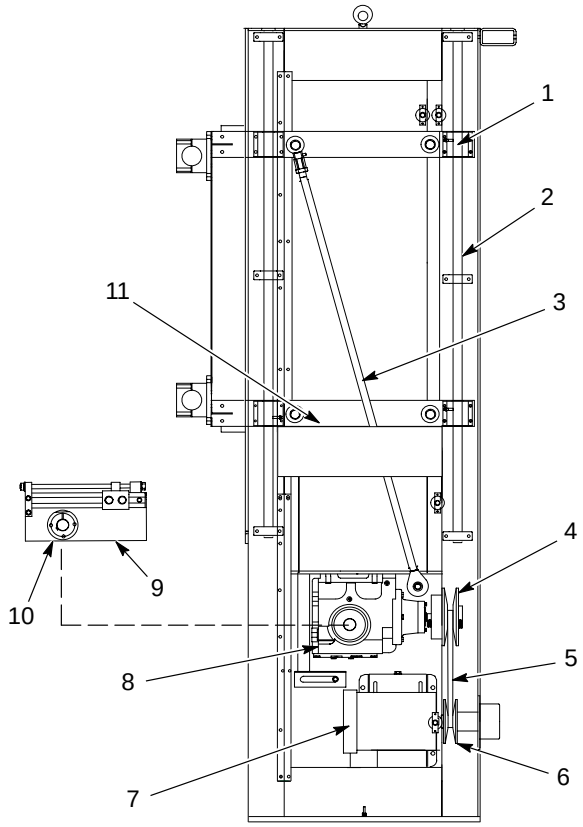

Figure 15 Gear Reducer and Connecting Link Replacement

1. Linear bearings
2. Guide rods
3. Connecting link
4. Gear reducer sheave
5. Drive belt
6. Motor sheave
7. Motor
8. Gear reducer
9. Crank arm assembly
10. Crank arm hub
11. Gun carriage

Connecting Link Replacement

WARNING: Be sure that the gun carriage is securely supported before proceding. Failure to observe this warning may cause the carriage to slip, causing property damage, personal injury, or death.

1. Turn off and lock out power to the oscillator.
2. See Figure 15. Place a support 2.5 cm (1 in.) below the carriage and lower the carriage onto the support. The 2.5-cm (1-in.) space facilitates assembly of the carriage drive components.

NOTE: The carriage can be supported by securing two-piece 2.5-cm (1-in.) bore clamp collars on the carriage guide rods (2) below the bearing blocks on each guide rod assembly.

3. Unbolt the connecting link (3) from the gun carriage plate and the crank arm assembly (9). Note the placement of the spacers used to install the connecting link.
4. Install the new connecting link, remove the gun carriage supports, and manually check the motion of the carriage.

Sheave Replacement

Use the appropriate procedure based on the type of oscillator you have (variable sheave or fixed sheave). This repair procedure is different for each type of oscillator.

NOTE: Always replace both the gear reducer and motor sheaves at the same time.

Gear Reducer Sheave Replacement

Variable-Sheave Oscillator

1. See Figure 16. Remove the gear reducer (7) from the oscillator. Refer to *Removing the Gear Reducer* for instructions.
2. Measure the distance between the gear reducer housing and the sheave (1). The new sheave must be installed in the same location as the existing sheave.
3. Remove the two bolts from the gear reducer sheave hub. Note that there is one tapped hole in the hub without a bolt.
4. Install one of the bolts into the empty tapped hole. Tighten the bolt to pry the sheave off the gear reducer shaft.
5. When the bolt is installed as far as it will go, pry the sheave off the gear reducer shaft.
6. Secure the new sheave to the gear reducer shaft using the two bolts. Position the new sheave in the same location as the old sheave.
7. Install the gear reducer into the oscillator. Refer to *Installing the Gear Reducer* for instructions.

Fixed-Sheave Oscillator

1. See Figure 16. Loosen the tension on the drive belt (3) using the motor base adjusting screw (6).
2. Measure the distance between the gear reducer (7) and the sheave (1). The new sheave must be installed in the same location as the existing sheave.
3. Remove the two bolts from the gear reducer sheave hub. Note that there is one tapped hole in the hub without a bolt.
4. Install one of the bolts into the empty tapped hole. Tighten the bolt to pry the sheave off the gear reducer shaft.
5. When the bolt is installed as far as it will go, pry the sheave off the gear reducer shaft.
6. Secure the new sheave to the gear reducer shaft using the two bolts. Position the new sheave in the same location as the old sheave.
7. Install the drive belt onto the gear reducer sheave. Increase the drive belt tension by turning the motor base adjusting screw.

Motor Sheave Replacement

Variable-Sheave Oscillator

1. See Figure 16. Remove the motor (4) and drive belt (2) from the oscillator. Refer to *Removing the Drive Belt* for instructions.
2. Measure the distance between the motor and the sheave (3). The new sheave must be installed in the same location as the existing sheave.
3. Loosen the motor sheave set screws and slide the sheave off the motor shaft.
4. Secure the new sheave to the motor shaft using the set screws. Position the new sheave in the same location as the old sheave.
5. Install the motor and drive belt into the oscillator. Refer to *Installing the Drive Belt* for instructions.

Fixed-Sheave Oscillator

1. See Figure 16. Loosen the tension on the drive belt (2) using the motor base adjusting screw (5).
2. Remove the drive belt from the motor sheave.
3. Measure the distance between the motor (4) and the sheave (3). The new sheave must be installed in the same location as the existing sheave.
4. Remove the two bolts from the motor sheave hub. Note that there is one tapped hole in the tapered hub without a bolt.

5. Install one of the bolts into the empty tapped hole. Tighten the bolt to pry the sheave off the motor shaft.
6. When the bolt is installed as far as it will go, pry the sheave off the motor shaft.
7. Secure the new sheave to the motor shaft using the two bolts. Position the new sheave in the same location as the old sheave.
8. Install the drive belt onto the motor sheave. Increase the drive belt tension by turning the motor base adjusting screw.

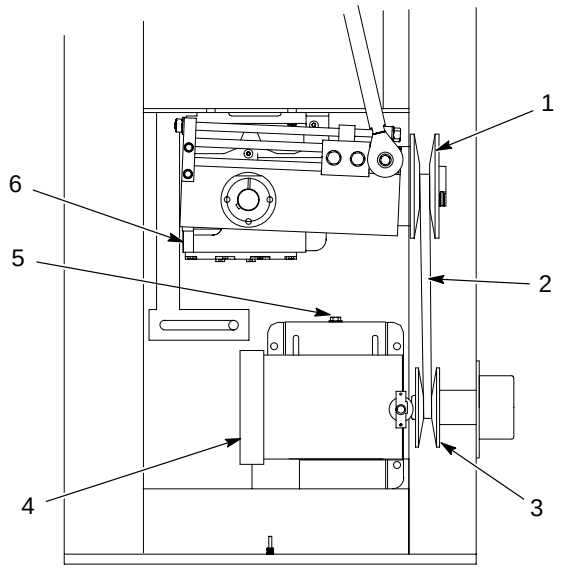

Figure 16 Sheave Replacement

1. Gear reducer sheave
2. Drive belt
3. Motor sheave
4. Motor
5. Motor adjusting screw
6. Gear reducer

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.

Variable-Sheave Oscillator Parts

See Figure 17.

Item	Part	Description	Quantity	Note
1	1017139	BEARING, rod end, number 1	1	
2	1017142	BEARING, linear	4	
3	1018007	SHAFT, class L, 1-in. dia x 51-in. long	2	B
3	1089682	SHAFT, class L, 1-in. dia x 60-in. long	2	C
4	1017140	BEARING, rod end, number 2	1	
5	1017964	PULLEY, variable pitch, 5.75-in. OD	1	
6	1018004	BELT, B section, 38-in. long	1	
7	1018005	PULLEY, variable pitch, 5.0-in. OD	1	
8	- - - - - -	MOTOR	1	A
9	- - - - - -	SENSOR, proximity, 2 wire, 5-25 Vdc, 18 mm	1	A
10	1017134	REDUCER, gear, helical worm, 66.44:1	1	

NOTE A: Contact your Nordson representative about the availability of these parts.
B: Used on VO618 oscillator only.
C: Used on VO624 oscillator only.

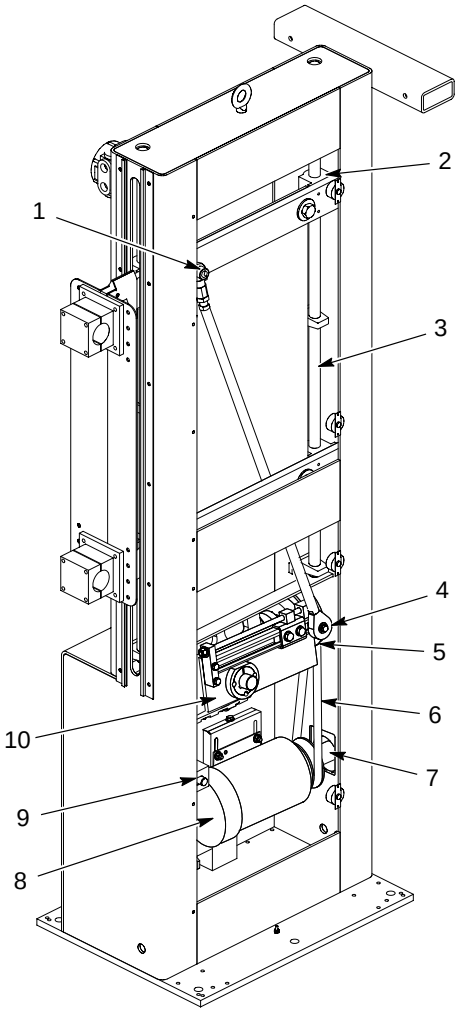

Figure 17 Variable-Sheave Oscillator Parts

Fixed-Sheave Oscillator Parts

See Figure 18.

Item	Part	Description	Quantity	Note
1	1017139	BEARING, rod end, number 1	1	
2	1017142	BEARING, linear	4	
3	1018007	SHAFT, class L, 1-in. dia x 51-in. long	2	B
3	1089682	SHAFT, class L, 1-in. dia x 60-in. long	2	C
4	1017135	SPROCKET, polychain, number 1	1	
5	1017140	BEARING, rod end, number 2	1	
6	1017136	BELT, polychain	1	
7	1017138	SPROCKET, polychain, number 2	1	
8	- - - - - -	MOTOR, 1.5 hp	1	A
9	- - - - - -	SENSOR, proximity, 2 wire, 5-25 Vdc, 18 mm	1	A
10	1017134	REDUCER, gear, helical worm, 66.44:1	1	

NOTE A: Contact your Nordson representative about the availability of these parts.
B: Used on VO618 oscillator only.
C: Used on VO624 oscillator only.

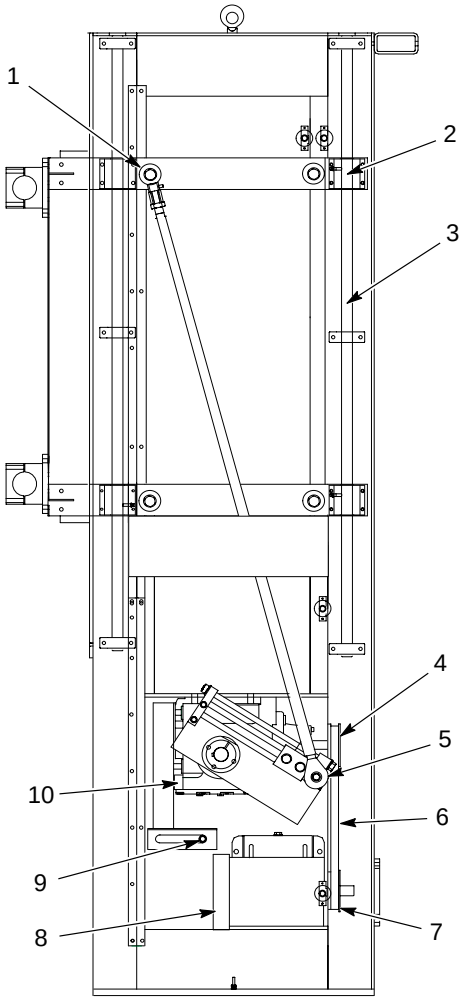

Figure 18 Fixed-Sheave Oscillator Parts

Specifications

General Specifications

Table 4 General Specifications

Hardware Specifications	
Power Supply	230/460 V, 3 phase, 60 Hz
Motor	See motor plate
Enclosure	XP (Explosion Proof) - Liquid Applications TEFC - Powder Applications
Frame	145T
Weight	295 kg (650 lb) without guns
Operating Specifications	
Gun Speed Velocity Range	Minimum: 9 cycles per minute (up and down) @ 20 Hz Maximum: 44 cycles per minute (up and down) @ 90 Hz
Stroke Center Line from Floor	1387 mm ($54\frac{5}{8}$ in.) (Without in/out positioner)
Stroke Length Adjustment (VO618 only)	152.4-457 mm (6-18 in.)
Stroke Length Adjustment (VO624 only)	152.4-610 mm (6-24 in.)
Maximum Payload to Stroke Rate Ratio	113.4 kg (250 lb) @ 279.4 mm (11 in.) stroke
Normal Operating Temperature	Less than 80 °C (175 °F)
Mounting and Operating Dimensions	Refer to *Dimensions*
Recommended Gear Reducer Oil	Mobil SHC636A-PAO or equivalent (AGMA 7 or 8)
Recommended Track and Connecting Link Grease	Mobilux EP2 grease or equivalent

Dimensions

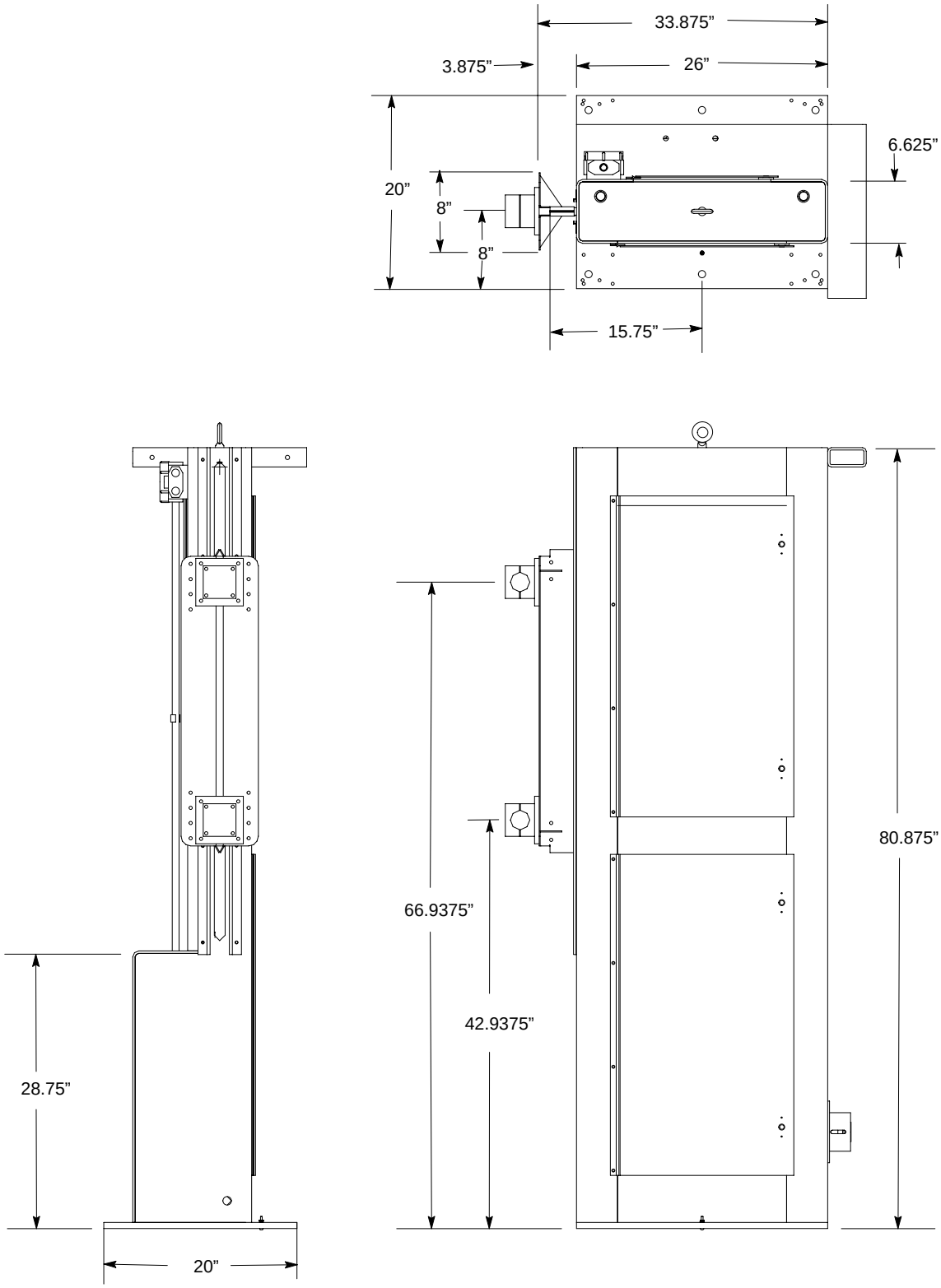

Figure 19 VO618N-XP Vertical Oscillator Dimensions