Supersonic Air Knife®

PNEUMATIC SOIL EXCAVATION

USER MANUAL

LT Line – Lightweight Models
ST Line – Stainless-Steel Models
HF Line – High Flow Models

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Supersonic Air Knife – Overview

The Supersonic Air Knife line uses high-pressure, high-flow air to safely and effectively dig trenches, remove compacted soils and locate utilities. Advanced nozzle technology delivers air at nearly twice the speed of sound to loosen even the most compacted soils without damaging tree roots, irrigation or power lines.

*Barrel, Nozzle and Wear Tip Materials Vary by Model

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Equipment Options & Model Numbers

LT (Lightweight) Line: The LT line utilizes aircraft aluminum for an extra lightweight option that is ideal for arborists, landscapers, irrigation trenching and light construction.

400-11	Supersonic Air Knife - LT Standard	Extra lightweight Supersonic Air Knife with a 42.5” barrel made from aircraft aluminum. Includes a stainless-steel nozzle and wear tip.
400-11-01	Supersonic Air Knife - LT Standard Kit	Includes LT Standard Supersonic Air Knife, 1" x 30' Air Hose with 2-Prong Chicago Couplings, and Travel Case.
401-00	Supersonic Air Knife - LT Liquid	Lightweight Air Knife with liquid injection capability. Uses a standard garden hose connection for injecting liquid into the work zone and cleaning surfaces. Includes 40.2” aluminum barrel with stainless-steel nozzle and wear tip.
401-00-01	Supersonic Air Knife - LT Liquid Kit	Includes LT Liquid Supersonic Air Knife, 1" x 30' Air Hose with 2-Prong Chicago Couplings, and Travel Case
420-00	Supersonic Air Knife - LT Vacuum	High value, lightweight vacuum utilizes the same compressor and supersonic technology to excavate soil and relocate it back to the dig site. Comes with 15' Vacuum Discharge Hose.
420-00-01	Supersonic Air Knife - LT Vacuum Kit	Includes LT Vacuum with 15' Vacuum Discharge Hose and Dirt Duffle Kit. *Air Hose Not Included.

ST (Stainless) Line: The ST line uses stainless-steel to provide a heavy-duty option for utility, construction and rescue operations.

402-11	Supersonic Air Knife - ST Standard	Heavy-duty Supersonic Air Knife with a 41” stainless steel barrel and stainless-steel nozzle and wear tip.
402-11-01	Supersonic Air Knife - ST Standard Kit	Includes ST Standard Supersonic Air Knife, 1" x 30' Air Hose with 2-Prong Chicago Couplings, and Travel Case
402-15	Supersonic Air Knife - ST Standard Cu	Heavy-duty Supersonic Air Knife with a 41” stainless-steel barrel, a brass nozzle, and copper wear tip. Ideal when spark resistance is needed.
402-15-01	Supersonic Air Knife - ST Standard Cu Kit	Includes ST Standard Cu Supersonic Air Knife, 1" x 30' Air Hose with 2-Prong Chicago Couplings, and Travel Case

All LT and ST models use a compressor psi/cfm of 125/185

Equipment Options & Model Numbers

HF (High Flow) Line: HF line provides high flow air to increase efficiency for trenching and large projects. Various nozzles and wear-tip assemblies including brass/copper and Delrin, along with a dielectric barrel option allow users to customize the HF line for specific needs.

403-11	Supersonic Air Knife - HF Standard	High flow Supersonic Air Knife with 42.5” lightweight aluminum barrel and stainless-steel nozzle assembly. Nozzles also available in brass/copper and Delrin.
403-11-01	Supersonic Air Knife - HF Standard Kit	Includes High Flow Supersonic Air Knife with stainless-steel nozzle and wear tip, 1.5" x 30' Hose with 4-Prong Chicago couplings, and travel case
404-00	Supersonic Air Knife - HF Liquid	High flow Air Knife with aluminum barrel and liquid injection capability. This tool has an aluminum nozzle and stainless-steel wear tip.
405-00	Supersonic Air Knife - HF Dielectric	High flow Air Knife with a lightweight dielectric barrel, Delrin nozzle and copper wear tip. Ideal for applications where dielectric properties are important.
405-00-01	Supersonic Air Knife - HF Dielectric Kit	High Flow Supersonic Air Knife with Standard Length Spark Resistant Delrin Barrel, Brass Nozzle and Copper Wear Tip, 1.5" x 30' Hose with 4-Prong Chicago Couplings, and Travel Case
421-00	Supersonic Air Knife - HF Vacuum	High value, high flow vacuum utilizes the same compressor and supersonic technology to excavate and relocate soil back to the dig site. Comes with 20' Vacuum Discharge Hose. *Air hose not included.
421-00-01	Supersonic Air Knife - HF Vacuum Kit	High value, high flow vacuum utilizes the same compressor and supersonic technology to excavate soil, reduce airborne dust and debris, and relocate soil back to the dig site. Comes with 20' Vacuum Discharge Hose and Dirt Duffle Kit.

All HF models use a compressor psi/cfm of 125/375

Supersonic Air Knife kits include travel case, 30’ air hose, & safety glasses.

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Compressor Compatibility

Air Pressure (psi):

- The optimal air pressure for soil excavation using the Supersonic Air Knife is 125psi.
- The Air Knife is effective as low as 90psi and as high as 250psi

CFM Rating:

It's critical to ensure that the Compressor being used has an equal or higher CFM rating as the Nozzle on the tool.

LT & ST Lines:

- The LT & ST models utilize nozzles designed to be compatible with a 185 CFM compressor. Increased efficacy can be achieved when using a compressor with a higher CFM rating.
- Connecting the LT & ST models to a compressor with a PSI rating lower than 125 and CFM lower than 185 will greatly reduce effectiveness and may render the tool inoperable.

HF Lines:

- The HF Standard utilizes a nozzle designed to be compatible with a 375 CFM compressor. Increased efficacy can be achieved when using a compressor with a higher CFM rating.
- Connecting the HF models to a compressor with a PSI rating lower than 125 and CFM lower than 375 will greatly reduce effectiveness and may render the tool inoperable.

Air Hose Compatibility

LT & ST Lines:

- It is recommended to use a 1"diameter air hose with LT & ST models.
- LT, ST & HF Kits include a 1" x 30' air hose.
- 1" forestry air hoses are available for purchase at 50' + 100' lengths.
- 1" air hoses come standard with 2-prong Chicago couplings

HF Line:

- It is recommended to use a 1.5"diameter air hose with HF models.
- Supersonic Air Knife Kits include a 1.5" x 30' air hose.
- 1.5" forestry air hoses are available for purchase at 50' + 100' lengths.
- 1.5" air hoses come standard with 4-prong Chicago couplings

Note: When using the Supersonic Air Knife for extended periods of time, friction from the moving air can cause wear and tear on the hose material. Make sure to monitor this, especially in hot conditions, or when using a compressor with a higher CFM rating than the Air Knife.

Equipment Safety Information

- Minimum Recommended Personal Protective Equipment. Please follow all ANSI standards for air excavation.
  - Ear Protection
  - Safety Goggles
  - Face Shield
  - Hard Hat/ Climbing Helmet
  - Construction Boots
  - Work Gloves
  - Durable Clothing
  - Air Hose Whip Cord*
- Do not point the Air Knife in the direction of yourself or others.
- Do not tie or lock the trigger in the 'engaged' position.
- Keep away from exposed or uninsulated electrical conductors
  - Specialty Air Knife Nozzles are available which can provide spark resistance for these conditions. (P/N: 450-402-25)
- Do not drop the Air Knife on a hard surface.
  - A more durable and heavier, Stainless-Steel Model is available which can handle more rugged conditions and abuse. (P/N: 402-11)
- Do not perform any maintenance while connected to an air source.
- Always use Cotter Pins on air hose connections.
- Make sure Air Hose is untangled and a safe distance from anyone nearby when activating compressor to fill with air.

*An Air Hose Whip Cord is included with HF models for added safety. Prior to using the device, attach the whip cord to the device barrel and to the hose to help secure the hose in the event of hose connection failure.

Equipment Operation – Excavation Tools

1. Before connecting to an air source, verify that the equipment is in good working condition, and free of any damage.
2. Make sure all operators and persons nearby are wearing appropriate PPE or have them standing at least 20' away from the excavation area.
3. Ensure that the air hose connections are secure, untangled, and fastened with Cotter Pins, then activate the Compressor.
4. Check the Pressure Gauge on the Air Knife and make sure it is reading at least 90psi to achieve supersonic airspeed.
    - If the gauge is reading below 90psi, the tool will not work as intended, and you may need to use a more powerful compressor.
    - The tool can function effectively up to 250psi but take care to make sure the hose does not overheat as a result of extended use.
5. Aim the Air Knife at the excavation site at a sharp angle, keeping the nozzle tip close to the ground at a maximum distance of 3 inches from the surface.
    - For vertical mulching: After digging a distance of one foot, clear the loosened soil by lifting the Air Knife back out to grade before continuing to excavate deeper.
6. Activate the Air Knife by depressing the spring action Trigger.
7. The Air Flow will stop as soon as the Trigger is released.

Equipment Operation – Vacuum Tools

1. Before connecting to an air source, verify that the equipment is in good working condition, and free of any damage.
2. Make sure all operators and persons nearby are wearing appropriate PPE or have them standing at least 20' away from the excavation area.
3. Ensure that the air hose connections are secure, untangled, and fastened with Cotter Pins, then activate the Compressor.
4. Check the Pressure Gauge on the Air Vac and make sure it is reading at least 90psi to achieve supersonic airspeed.
    - If the gauge is reading below 90psi, the tool will not work as intended, and you may need to use a more powerful compressor.
5. Ensure the rubber discharge adapter is securely tightened over the discharge end of the tube (i.e., completely covering the tube). Always stake the discharge hose and point it in a safe direction so the excavated debris is directed away from the dig site, operators and persons nearby.
6. Hold the AIR VAC at 45 degrees to the ground or at a convenient angle at which the operator can work comfortably. Hold the bottom of the suction barrel close to the loose material to be excavated. A distance of 3" or more will significantly reduce effectiveness.
7. Select the area to be excavated and move the lower, suction end of the AIR VAC barrel directly over the material to be lifted and provide a small gap for the surrounding air to also enter the barrel. The operator should try to maintain a ratio of material (against the barrel opening) to open air (at the barrel entrance) of about 2/3 to 1/3.
8. Activate the Air Knife by depressing the spring action Trigger.
9. The Air Flow will stop as soon as the Trigger is released.

Equipment Operation – Attaching Vacuum Adapter

1. Attach the discharge hose to the vacuum adapter barrel before connecting to the LT or ST Standard device.

2. Ensure the rubber discharge adapter is securely tightened over the discharge end of the tube (i.e., completely covering the tube) with the clamps snug to the rubber.

3. Always stake the discharge hose and point it in a safe direction so the excavated debris is directed away from the dig site, operators and persons nearby. To switch from the digging tip to the vacuum adapter, locate the two fittings with stainless steel rings at the airflow end of the device.

4. Loosen the fittings by pulling them toward the end of the barrel where air is released. From there, you should be able to remove the digging tip.

5. With the fittings still disengaged, slide the end of the LT or ST Standard device onto the corresponding connection point on the vacuum barrel.

6. Lock the fittings back into place by pulling them back toward the handle of the device.

Troubleshooting Tips

- Pressure Gauge is reading < 90psi
  - Shorten length of hose by moving compressor closer to work site, remove the line, submerge tip and pulverize from below
  - Increase pressure on the compressor if possible
  - Check for leaks in the hose connections and tool fittings
  - Upgrade to a larger compressor
- Air is flowing while valve is in closed position
  - Replace Valve Cap O-Ring
- Ground is too dry and compacted
  - Soak the area with water ahead of time to loosen the soil
  - Submerge the nozzle tip and pulverize the soil from below
- Trigger Handle is loose
  - The valve spring may have failed or the trigger axel pin is bent or snapped. Disassemble the valve body to investigate.
  - Valve assembly video available on Arborjet YouTube Channel
- Trigger is sluggish, not retracting, not smooth
  - Apply lubricant to the valve assembly such as Parker O-Lube.

Replacement Parts List

Universal Valve Assembly
(450-000-2)

Stainless Steel Nozzle
(450-400-06)

Brass-Copper Nozzle
(450-402-25)

Valve Base & Valve Cap
(470-002, 470-003)

Valve Stem Guide
(470-006)

Valve Pressure Gauge
(470-016)

Valve Cap Dowel Pin
(470-017)

Valve Stem
(470-007)

Valve O-Ring Kit
(450-000-3)

- White Valve Gasket
- Stem Guide O-Ring (outer)
- Stem Guide O-Ring (inner)

Pin Retainer
(470-005)

Valve Spring
(470-007)

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