SYEN·SET
Systems for engraving and stone setting

EnSet™ & EnSet Plus™ Operating Instructions

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NOTE: Please read this information carefully before using your EnSet™ or EnSet Plus™ unit.

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SYSTEM CONTENTS

Each EnSet™ unit (original and Plus) includes:

- EnSet™ Complete Control Unit
- Drain Bowl Auto-Purging Filter
- Foot Control
- Power Supply
- Hand piece
- Striker Heads (3)
- Collets (3)
- Hex Wrenches (2)

Please verify the contents in the box before connecting the machine.

ASSEMBLY

- Place your EnSet™ unit upright on a level work surface.
- Plug the foot control into the port in the lower left rear of the machine(#3). Align the plug using the small index bump. Push the Foot Pedal Plug into the machine port and turn slightly to the right to lock in the Foot Pedal Cord.
- Remove the power supply from its box. Select and install the correct plug according to your geographic area (power supply includes international plugs).
- Plug the power supply into the port in the lower right rear of the machine(#5).
- Connect to a source of compressed air (#6) (**max. needs 65 PSI – 4.48 BAR). Note**: The *compressed air source must be clean and not contain oil or excess moisture*. The filter on the back of the machine (#2 in figure below) will remove moisture, but it will not remove oil. For best results with an oil compressor use an oil coalescing filter in the line before the EnSet unit.
- Plug handpiece connector into the front panel Hand piece port. Align threads and screw in clockwise until snug (not too tight).

Figure 1

OPERATING THE CONTROL UNIT

Once your new EnSet™ unit is assembled, it is ready to be adjusted and operated.

To adjust the EnSet™

Figure 2

1. Plug the power supply into an outlet.
2. Place the foot control at your desired position on the floor.
3. Turn Power ON using the rocker switch on the front of the machine.
4. Adjust desired pressure between 35 PSI – 2.41 BAR and 65 PSI – 4.48 BAR by adjusting pressure regulator. Turn knob to the right to increase air pressure, to the left to decrease air pressure.
5. Push foot control to start cutting with EnSet.
6. Step on foot pedal to activate machine and hand piece.
7. Adjust strokes per minute (1 to 1500) by applying lighter or heavier pressure on the foot control.

To adjust the EnSet Plus™

Figure 3

1. Plug the power supply into an outlet.
2. Place the foot control at your desired position on the floor.
3. Turn Power ON using the rocker switch on the front of the machine.
4. Select your EnSet Plus™ Mode. Press "Mode" button to toggle back and forth between original and plus modes.

EnSet Plus™ works on a dual control mode basis. EnSet Original mode and EnSet Plus mode. Below you will find indications in how to operate both control modes.

5. **EnSet Plus™ Pressure Mode**
    a. In this mode you set the air pressure for the input and the foot pedal controls the number of impacts per minute (speed) of the tool. In the Pressure Mode the air pressure is displayed in the top "Pressure" window. The bottom window displays "0" (Zero) until you engage the foot pedal. Once you step on the foot pedal you will see a variable number of pulses in the bottom window.
    b. Use the (+) and (-) buttons to the right of the top pressure window to adjust the working air pressure up or down between 35-65 PSI (2.41-4.48 BAR)
    c. In this mode the number of impacts per minute will be displayed in the bottom window as you step on the foot pedal. The harder you step on the foot pedal the more impacts will occur (faster speed). The display in the bottom window will continually adjust based on how much pressure is being applied to the foot pedal.
    d. The number of impacts displayed in the bottom "Pulse" window must be multiplied by 60 to get the actual number of impacts/minute. For example:

i. 1 * 60 = 60 impacts/minute
ii. 4 * 60 = 240 impacts/minute
iii. 10 * 60 = 600 impacts/minute
iv. Maximum number of impacts/minute is 1500 (25 * 60)

6. **EnSet Plus™ Pulse Mode**
    a. In this mode you will always have the same number of impacts/minute no matter how much pressure is applied to the foot pedal. The machine will always run at the same speed. As you depress the foot pedal the power in each impact will increase and conversely, as you ease up on the foot pedal the power will decrease.
    b. In the Pulse mode both windows will display "0" (Zero) when you are not actively setting them. During operation the bottom window will display the number of impacts that you set and the top window will display air pressure. The top window air pressure will fluctuate according to how hard you are stepping on the foot pedal. The more pressure on the foot pedal, the more air pressure and power with each impact. The less pressure the less power with each impact.
    c. Use the (+) and (-) buttons to the right of the top pressure window to set the maximum air pressure you desire. The minimum air pressure is already programmed into the system. This feature is useful because it can act as a limiter. Once set, it will only let the machine increase the impact power up to the set air pressure. If you would like it to have the full range of impact set this air pressure to 65 PSI (4.48 BAR). The air pressure may be adjusted at any time using the pressure (+) and (-) buttons.
    d. Use the (+) and (-) buttons to the right of the Pulse window to set the desired number of impacts/minute. The window will display a number between 1-25 corresponding to the speed. Multiply the number by 60 to calculate the actual number of impacts/minute. For example:
        i. 1 * 60 = 60 impacts/minute
        ii. 4 * 60 = 240 impacts/minute
        iii. 10 * 60 = 600 impacts/minute
        iv. Maximum number of impacts/minute is 1500 (25 * 60)

    NOTE: The number displayed in the bottom window may go above 25 on some units. However, the speed will only increase to a maximum of 25 (1500 impacts/minute). The machine will not go faster even if you select a number over 25.

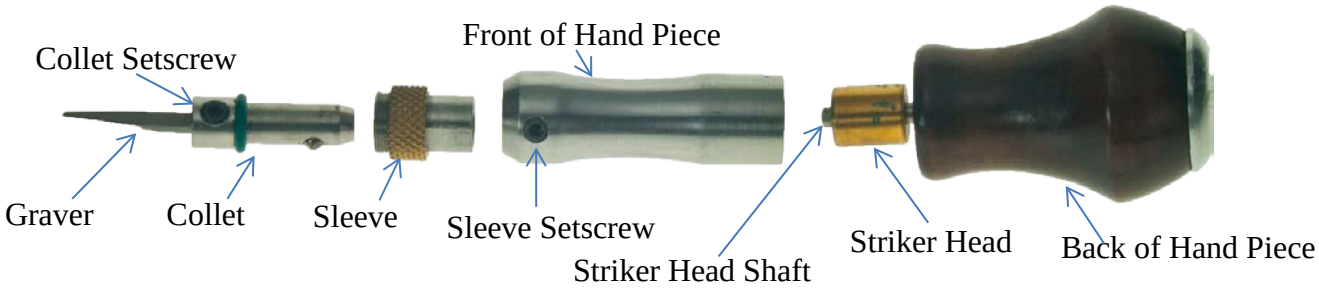
Tuning the EnSet™ Units for Optimum Air Pressure Through Full Range of Speeds:

1. Turn air pressure on machine to 32 PSI (2.20 BAR)
    a. On EnSet unit - turn knurled knob to increase or decrease pressure
    b. On EnSet Plus unit
        i. Make sure you are in "Pressure Mode" when tuning the EnSet™ Plus

    ii. Press (-) or (+) button to right of Pressure window to increase or decrease air pressure
2. Hold hand piece in your hand
3. Step on foot pedal and press until pedal is completely engaged (all the way to floor)
4. Continue to hold foot pedal down
5. While holding foot pedal slowly increase pressure up to 65 PSI (4.48 BAR)
    a. Watch the air pressure on the gauge or in the Pressure window
    b. Notice where the hand piece has crisp powerful taps and where the power starts to fall off. There is a pressure around 40-50 PSI where there is good power and crisp tapping at the fastest speed (foot pedal to floor). Once the air pressure gets too high the power of the impacts starts to decrease at the highest speed.
    c. Dial the air pressure back down to the range where you have the best power through the high speed range.
6. This will give you an optimum air pressure to have excellent power through the entire speed range of the tool.

If you need increased power especially on the slower speed then you may dial the air pressure up to 65 PSI (4.48 BAR). This will give you very powerful impacts on the slow speed needed for setting gold, punch dot backgrounds or for sculpting/heavy work especially when paired with the heaviest striker head (12 grams).

HANDPIECE SETTINGS



IMPORTANT NOTE: In order to obtain the highest performance of your impact handpiece, make sure to align the striker head on the shaft with the setscrew tightened in the indented area. This will ensure that the tool will move freely so that the striker shaft impacts the graver collet. The machine operates most efficiently with the striker head in this position on the shaft.

Striker Head

Figure 4

1. To change the striker head, unscrew the hand piece in the middle to gain access to the striker head shaft.
2. Select desired striker head according to desired power. There are 3 striker heads that come with the hand piece unit:

Small	Aluminium	For light shading and fine work
Medium	Brass	For overall cutting work
Large	Tungsten	For heavy work

3. Remove striker head currently on shaft by loosening the setscrew and sliding the striker head off the end.
4. Slide desired striker head on to shaft. Note that shaft has indented area that will position striker head correctly. Look through hole opposite the setscrew to view indentation on shaft. Position striker head so setscrew will tighten in indentation on shaft. **Firmly** tighten setscrew to affix striker head. Striker head should not be all

the way to the bottom of shaft so it is sitting on hand piece handle, nor should it be all the way to the top of shaft or it will impact the inside of cylinder area and not efficiently impact the back of the collet/graver.

5. Reassemble hand piece by screwing front and back of hand piece together.

NOTE: Sometimes during heavy hitting the striker head may become loose. You will hear a difference in the sound of impact when this happens. **Unscrew hand piece and re-tighten setscrew to secure striker head** to prevent damage to the tool.

Stroke Length Adjustment

Figure 5

The EnSet tool allows the user to choose the stroke length of each impact by adjusting where the striker head impacts the collet. It can barely tap the back of the collet for light, fine work or it can impact the collet fully for much more power in each stroke.

Basic Stroke Length Adjustment:

1. Install graver into collet, tighten collet setscrew.
2. Insert collet with graver into hand piece sleeve. Rotate collet until detent ball "clicks" into position. You will feel that there is resistance to rotating the collet once it is set in position. To remove collet - twist collet/graver until detent ball releases from lock position and remove from hand piece sleeve.
3. Loosen setscrew on front of hand piece. Do not take setscrew out - just make it loose enough that sleeve can move in and out of front end.
4. Hold the collet/graver lightly in sleeve. Hold them against the front of the hand piece. Align flat area of sleeve under Sleeve Setscrew.
5. While holding collet/graver - step on foot pedal to actuate machine.
6. While hand piece is striking, turn knurled ring to the left until you can hear that the striker head is not directly impacting the back of the collet. You will hear and feel that the striker head does not have a crisp hit on the collet as you turn the knurled ring to the left.
7. Keep machine on so that the striker head is active.
8. While the machine is working, slowly turn knurled ring to the right. Listen to the sound and pay attention to the feel of the tool in your hand. Keep turning the ring until you hear crisp taps on the back of the collet. This is where the striker head starts to come into direct contact with the back of the collet.
    a. For a longer stroke with more power - turn ring more to right
    b. For a shorter stroke with less power - turn ring to left ("LEFT is LESS").
    c. If you turn the ring too much to the left so the collet is not impacted, then the tool will not function efficiently.

9. When you have the tool adjusted to the stroke length you desire tighten the setscrew on the front end of the hand piece to lock the sleeve in place. Make sure setscrew is tightened on the flat area of the sleeve. The setscrew needs to only be snug. Do not over tighten the setscrew or you may collapse the sleeve and bind the collet so it cannot move. There is not much pressure needed on the sleeve to keep it in place.
10. You can re-adjust stroke length at any time depending on the power or character of the cut you wish to make.
    a. Shorter strokes = less pronounced progress marks, less power/impact
    b. Longer strokes = more pronounced progress marks, more power/impact

Advanced Stroke Length Adjustment

Another way to adjust the stoke length is to adjust it while actively engraving. Use a practice piece for this method until you fully understand the adjustments so as to not ruin your work.

1. Install graver into collet, tighten collet setscrew.
2. Insert collet with graver into hand piece sleeve. Rotate collet until detent ball "clicks" into position. You will feel that there is resistance to rotating the collet once it is set in position. To remove collet - twist collet/graver until detent ball releases from lock position and remove from hand piece sleeve.
3. Loosen setscrew on front of hand piece. Do not take setscrew out - just make it loose enough that sleeve can move in and out of front end.
4. Hold the collet lightly in sleeve with the hand you engrave with. Align flat area on sleeve under sleeve setscrew. Hold the collet and sleeve against the front of the hand piece by gripping the collet-sleeve unit with your thumb and index finger.
5. While holding collet against front of tool place graver down onto practice plate just like you would engrave.
6. Step on foot pedal and begin to engrave. Remember to keep slight pressure on collet/graver so it does not slip out of front of tool.
7. While continuing to engrave, slowly turn the knurled ring to right or left to adjust stroke length longer or shorter. Use your thumb and index finger to adjust the ring.
    a. For a longer stroke with more power - turn ring more to right
    b. For a shorter stroke with less power - turn ring to left ("LEFT is LESS").
    c. If you turn the ring too much to the left so the collet is not impacted, then the tool will not function efficiently.
    d. The longer the stroke, the more percussive the collet/graver. It will travel much farther and will need more pressure to hold it into the hand piece.
8. Choose a moderate speed to engrave while adjusting. If the speed is too slow it is difficult to feel the stroke length.
9. Once you have identified the stroke length that suits your project/engraving, pick up hand piece from work and tighten setscrew.
10. You can re-adjust stroke length at any time depending on the power or character of the cut you wish to make.
    a. Shorter strokes = less pronounced progress marks, less power/impact
    b. Longer strokes = more pronounced progress marks, more power/impact

MAINTAINANCE

EnSet™ is a strong and reliable electro-pneumatic system. However, some elements have a limited life and need to be replaced from time to time. Below please find a detailed list of actions in order to preserve your machine's life:

Drain Bowl – Particle Filter

EnSet™ incorporates an auto-purging drain bowl on its rear panel. Auto purging is intended to occur each time air line is loaded with air. In any case it is important to take constant care of the drain bowl and purge it manually if necessary in order to avoid moisture getting into internal components of the machine.

The particle filter needs to be kept clean. It is recommended to replace your particle filter once per year in order to make sure no dirt reaches the internal components. If the filter becomes visually tarnished or dirty, replace your filter as soon as possible to prevent possible damage.

Air Supply: Some silent air compressors work on basis of an oil cooled motor. If this is the case with your compressor, please remember your compressor can send oil particles into EnSet™ internal components through the air line. An oil coalescing filter is suggested in order to avoid oil contamination. Oil needs to be fully replaced periodically in oil lubricated compressors.

NOTE: External contamination caused by oil, water, moisture and / or dirt will **cause damage to the machine.** Damage from failing to properly clean the machine or ensuring a clean air supply is excluded from manufacturer's warranty or responsibility.

EnSet™ system, including control unit, foot control and handpiece do not need lubrication for its operation. Do not use oil or other lubrication in them.

Lubricate your EnSet™ collet O-rings periodically for easier insertion into the front of the hand piece. We recommend Super Lube® synthetic grease to keep O-rings flexible.

EnSet™ hand piece incorporates a cylinder/ piston system. In order **to keep maximum power**, we recommend replacing this mechanism each 18-24 months, depending on amount of activity.

WARRANTY

EnSet™ and EnSet Plus™ including the control unit, power supply, foot control and handpiece are covered for a two (2) year period under warranty. Warranty covers components, parts and labor.

This warranty excludes misuse, external contamination from the air supply (oil, water, dirt particles), an eventual electrical surge, impacts or accidental situations occasioned by thirds.

If you experience technical problems or questions, please contact Syenset, S.L. or one of our authorized representatives in your area.

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