SIMPSON
A Norican Technology

Operating Instructions

Digital Pneumatic Sand Squeezer

Model 42160

Type:	Digital Pneumatic Sand Squeezer
Model No.:	42160
Part No. :	0042160-M-ASM / 0042160-ASM
Serial Number :	

Name and address of manufacturer:

Simpson Technologies
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Naperville, IL 60563

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1 Introduction

Congratulations, you have just purchased an extremely reliable sand testing instrument that is backed by the professional technical support and years of proven sand technology experience of Simpson Technologies .

This laboratory equipment is constructed of quality materials and is the result of unsurpassed craftsmanship. The Digital Pneumatic Sand Squeezer should be operated only when it is in perfect condition, in accordance with its designed purpose and being aware of possible hazards. Observe the safety instructions in Section 2 and operating instructions in Section 5.

1.1 Application and Designated Use

The Digital Pneumatic Sand Squeezer, Model 42160, is intended exclusively for determining the compactability and preparation of standard 2 in x 2 in (50mm x 50mm) sand specimens of prepared molding sand used in the foundry. Usage of other materials may be possible upon consultation with the Technical Service department of Simpson Technologies.

Any other application outside the intended usage will be regarded as use not in accordance with its purpose, and, therefore, the manufacturer / supplier will not be held liable for any damage that might arise thereunder. The risk in this case will be exclusively that of the User.

1.2 Organizational Measures

The operating instructions should be readily available at the place of operation. In addition to the operating instructions, the general legal regulations or other mandatory rules for prevention of accidents and environmental protection should be made known and be observed!

The personnel instructed to use this apparatus, before beginning work, should have studied and fully understood these Operating Instructions, in particular the "Safety" chapter.

No modifications, extensions or changes of design of the device that would impact safety requirements should be put into effect without prior consent of the supplier! Spare parts must conform to the technical specifications defined by the manufacturer. This is always guaranteed when using original spares.

2 Safety

NOTICE *Before operating and/or performing maintenance or repair on Simpson Technologies designed and/or manufactured equipment, it is required that all personnel have read and understood the entire Operating Instructions manual. If any questions exist, you must contact your supervisor or Simpson Technologies before taking further action.*

If properly operated and maintained, your Simpson Technologies supplied equipment can provide many years of dependable and safe operation. Please follow all recommended safety, operating, and maintenance instructions. Furthermore, the introduction of any non-Simpson Technologies manufactured and/or approved parts to the equipment may create a hazardous situation. Never alter the equipment without prior consultation with Simpson Technologies .

DO NOT use this machine for purposes other than that for which it was intended. Improper use could result in death or serious injury.

2.1 Safety Signs and Labels

Simpson Technologies has incorporated the ANSI Z535.6 / ISO 3864-1-2 safety symbol only label format on all of its laboratory equipment.

The harmonized ANSI Z535.6 format became an established safety label format since it not only fully meets the current ANSI Z535 standards, but also incorporates ISO 3864-2 symbology and hazard severity panel and thus, can be used for both the U.S. and international markets.

2.1.1 Safety Alert Symbols

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. OBEY all safety messages that follow this symbol to avoid possible injury or death.

DANGER ! *Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.*

The safety alert symbol used without a signal word to call attention to safety messages indicating a potentially hazardous situation which, if not avoided, could or may result in death or minor to serious injury.

NOTICE indicates information used to address practices not related to personal injuries but may result in property damage.

This symbol indicates information containing important instructions concerning the use of the machine or directions for further procedures. Ignoring this information can lead to malfunction of the machine.

2.1.2 Safety Symbol Labels

ELECTRICAL SHOCK / ELECTROCUTION

(STC #217958)

This label is located on the back of the unit close to the electrical power receptacle.

With the back electrical panel or the front control panel removed, the electrical power supply and electrical terminals are exposed. A hazardous voltage is present, can cause electric shock or burn, and will result in serious injury. Follow **Lockout and Tagout** procedures before servicing.

HAND CRUSH / FORCE FROM ABOVE

(STC #214058)

This label is located on the front of the unit below the control panel.

The compacting head moves down, driven by a pneumatic cylinder, while performing a test or calibrating the sand squeezer which may **crush** or **cut** body parts. Follow **Lockout and Tagout** procedures before servicing.

EXPLOSION / RELEASE OF PRESSURE
(STC #217945)

This label is located on the back of the unit on the lower end and above the pneumatic tubing connections.

With pneumatic pressure present, disconnecting or cutting the pneumatic tubing will release the pressure contained within the tubing. Blown-out air with or without solid particles in the air stream may get into the eyes and may irritate or damage the eye. Follow **Lockout and Tagout** procedures before servicing.

READ AND UNDERSTAND ALL SERVICE MANUAL INSTRUCTIONS

(STC #214042)

This label is located on the front of the unit on the base upper right hand corner.

Before operating and/or performing any maintenance or repair on Simpson Technologies designed and/or manufactured equipment, it is required that all personnel read and understand the entire Operating Instructions manual. All protective guards and covers shall be installed, and all doors closed before operating the equipment. If any questions exist, you must contact your Supervisor or Simpson Technologies before taking further action. Follow **Lockout and Tagout** procedures before servicing.

2.2 Lockout and Tagout System Procedure

NOTICE

Whenever performing any type of maintenance or repair, whether in the form of cleaning, inspection, adjustment, mechanical or electrical maintenance, the equipment must be rendered into ***Zero Mechanical State (ZMS)****.*

Prior to any maintenance (routine or otherwise) or repair of equipment, a safety procedure should be established and maintained. This procedure should include training of personnel, identification and labeling of all equipment which is interlocked mechanically, electrically, through hydraulics, pneumatics, levers, gravity or otherwise, and a listing of the established lockout procedures posted on each piece of equipment.

"Lockout and Tagout" refers to specific practices and procedures to safeguard personnel from the unexpected energizing of machinery and equipment, or the release of hazardous energy during service or maintenance activities. This requires, in part, that a designated individual turns off and disconnects the machinery or equipment from its energy source(s) before performing service or maintenance, and that the authorized employee(s) lock or tag the energy-isolating device(s) to prevent the release of hazardous energy and take steps to verify that the energy has been isolated effectively.

2.2.1 Lockout and Tagout Devices

When attached to an energy-isolating device, both lockout and tagout devices are tools used to help protect personnel from hazardous energy. The lockout device provides protection by holding the energy-isolating device in the safe position, thus preventing the machine or equipment from becoming energized. The tagout device does so by identifying the energy-isolating device as a source of potential danger; it indicates that the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed.

2.2.2 Glossary:

Authorized Person(s) - Personnel who have been designated by his/her department to perform maintenance or service on a piece(s) of equipment, machinery or system, and are qualified to perform the work through proper training on the Lockout/Tagout procedures for the equipment, machinery or system.

Lockout - The placement of a lockout device on an energy isolating device, in accordance with an established procedure, to ensure that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout Device - Any device that uses positive methods, such as a lock (either key or combination type), to hold an energy isolating device in a safe position, thereby preventing the energizing of machinery or equipment. When installed, a blank flange or bolted slip blind are considered equivalent to lockout devices.

Tagout - The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Tagout Device - Any prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure. The tag indicates that the machine or equipment to which it is attached is not to be operated until the tagout device is removed in accordance with the energy control procedure.

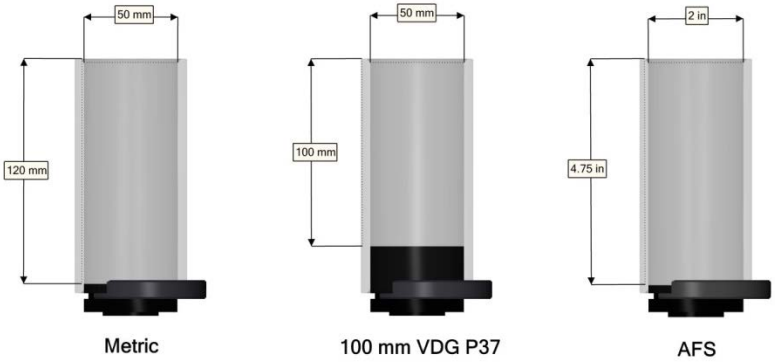
Zero Mechanical State - The mechanical potential energy of all portions of the equipment or machine is set so that the opening of pipes, tubes or hoses, and the actuation of any valve, lever or button, will not produce a movement which could cause injury.

3 Short Description & Specifications

3.1 Application

The Digital Pneumatic Sand Squeezer, Model 42160, is used to prepare standard 2" x 2" AFS or 50mm x 50mm metric sand specimens and to determine the compactability of prepared clay bonded molding sand used in a foundry. The standard sand specimen is used in various tests including permeability, compressive strength, shear strength, etc. The sand squeezer can be a replacement for the standard 3-ram method of making sand specimens using a traditional sand rammer. The squeezer is considered more representative of molding machines that utilize high pressure squeezing. The compactability and displacement are automatically calculated and digitally displayed after the cylinder compresses the sand sample. The actual squeeze pressure that is operator configurable via the included pneumatic regulator is also displayed on the digital display.

Compactability, green compression, permeability test results from sand specimens prepared in a pneumatic squeezer may differ from sand testing results from the same sand prepared in a standard sand rammer.



Various Specimen Tube and Pedestal Specifications

3.2 Description

The Digital Pneumatic Sand Squeezer, Model 42160, was designed to mimic the compressing action of an automatic molding machine in order to measure the effects the sand has upon its compaction abilities. The basic squeezer consists of a pneumatic regulator and a valve that controls the feed pressure into a cylinder.

After the prepared molding sand sample is loaded into the specimen tube assembly, the specimen tube and tube pedestal are placed into the sand squeezer, the operator activates a variable control valve. Once the valve is opened, the cylinder slowly extends, and the operator guides the compacting head to the top of the specimen tube ensuring the alignment is correct. The operator will completely open the valve once the compacting head of the squeezer clears the top of the specimen tube (which will slightly compact the sand sample). This action will cause the compacting head of the squeezer to lower further into the specimen tube assembly, which in turn will compress the sand sample to a set force dictated by the pneumatic regulator. Once the sample is compacted and the compacting head is no longer in motion, the test is completed and the resultant compactability, squeeze pressure and specimen height are digitally displayed.

3.3 Specifications, Dimensions and Weights (Approximate)

Specifications	Digital Pneumatic Sand Squeezer
Length	330 mm (13 in.)
Width	229 mm (9 in.) (Including Handle)
Height	533 mm (21 in.)
Weight	26 kg (57 lbs.)
Power	100-240 VAC 50/60 HZ, 2 amp, grounded
Compressed Air	Filtered air with oil, regulated between 2.5 and 6.5 bar (35 psi to 94 psi)

3.4 Tube Filler Accessory (Model 42100A/42100A-M)

This accessory is required with the Sand Rammer (Model 42100), Pneumatic Sand Squeezer (Model 42117), and the Digital Pneumatic Sand Squeezer (Model 42160) to determine the compactability of prepared molding sand.

Specifications	Tube Filler Accessory
Length	ca. 210 mm (8.25”)
Width	ca. 210 mm (8.25”)
Height	ca. 356 mm (14”)
Weight	ca. 1.2 kg (2.6 lb.)

4 Unpacking and Installation

4.1 Unpacking

NOTICE

Your new Laboratory Equipment has been thoroughly inspected before being shipped to your plant. However, damage can occur en route, so it is wise to inspect all equipment on arrival. Notify both the carrier and Simpson Technologies of any damage at once. Damage should be noted on the shipper's receipt before signing for receipt of the shipment.

The Digital Pneumatic Sand Squeezer, Model 42160, is shipped in one piece and is intended to be used as received; no further assembly/disassembly is required. No lifting equipment is required for handling. The machine weighs approximately 25 kg (56 lbs). Due to its bulky dimensions and tight fitting shipping crate, it is recommended that two people remove the equipment from the crate. Whenever positioning or relocating this instrument, two people should be utilized. The approximate instrument dimensions are 330mm x 229mm x 533mm (13 in. x 9 in. x 21 in.). Its shipping weight (in a crate) is 33 kg (73 lb.).

ONLY authorized personnel may unload and install this equipment. Two people may be required to unpack this instrument due to the bulky dimensions and tight fitting packing crate.

1. Remove any loose accessories/parts from the shipping crate and place in a location away from any packaging material to assure that these items are not misplaced.
2. Carefully remove the sand squeezer from the packing crate and place it on stable bench.
3. Once removed from the crate, proceed by taking off any protective wrap and unpackage the protective material from the included accessories.

4. The packaging remains the property of the Customer and may be used for returning the apparatus if some repair is required.

4.2 Components

Your new Digital Pneumatic Sand Squeezer is shipped with the following accessories and installation components. Please take a moment to identify that the following items were included:

- Digital Pneumatic Sand Squeezer
- Pneumatic Regulator/Filter/Lubricator
- Pneumatic Tubing - Approximately 1m (3')
- Male Disconnect for Outlet of Pneumatic Regulator to Pneumatic Tubing
- 50mm Calibration Gauge Block (1x)
- 10mm Calibration Gauge Blocks (5x)
- Specimen Tube
- Pedestal
- Removable (Pedestal) Collar
- Stripping Post
- Specimen Tube Swab
- Power Cord

NOTICE

Do not store the device in the open and unprotected from atmospheric conditions. If this instruction is not followed, claims under guarantee will no longer be considered.

4.3 Installation

The installation of the apparatus is the responsibility of the Client to include procuring and preparing the material required for this purpose.

It is recommended that the Digital Pneumatic Sand Squeezer should be situated close to the Digital Absolute Permmeter and Universal Sand Strength Machine.

The Digital Pneumatic Sand Squeezer should be placed on a stable bench. It is recommended that the squeezer should be situated close to the Digital Absolute Permmeter and Electronic Universal Sand Strength Machine.

The sand squeezer would likely be occupied by one operator at a time. It is used in a foundry sand laboratory, with its operation display and control buttons placed at about eye level for the operator. It should be placed in an ergonomically correct position to allow the operator to comfortably handle the sand sample as well as the control buttons.

4.4 Electrical and Pneumatic Power Connection

Electrical Requirements: 100 - 240 Volts, 50-60 Hz + Ground (5Ω or less).

Pneumatic Requirements: Compressed air that is filtered and regulated between 2.5 to 6.5 bar (35 psi to 94 psi)

Connect the equipment to a grounded electrical outlet.

Before connecting the equipment, an approved pneumatic safety Lock-Out air valve must be installed in the supply airline. This item is not supplied with the Digital Pneumatic Sand Squeezer and is the responsibility of the customer to provide and install.

Verify that the voltage marked on the serial number nameplate is the same as the electrical outlet to be used for the machine. Outlet must be properly grounded! Failure to follow safety procedures could result in serious injury.

A pressure regulator/filter/lubricator and length of pneumatic hose required to connect the Digital Pneumatic Sand Squeezer to the regulator/filter/lubricator has been included with the Digital Pneumatic Sand Squeezer.

NOTICE

The compressed air should be free of dirt, debris and condensate. Debris and condensate will cause damage to the Digital Pneumatic Sand Squeezer.

NOTICE

Do not operate the Digital Pneumatic Sand Squeezer without first filling the pneumatic lubricator with standard pneumatic tool oil/lubricant and setting the proper oil addition rate on the pneumatic lubricator. Failure to properly set up the pneumatic lubricator will result in erratic operation and will prematurely destroy the cylinder seal kit and potentially damage the cylinder.

4.5 Connecting Power and Set-Up

1. Verify the voltage on the specification plate located on the back of the Digital Pneumatic Sand Squeezer. Connect the power cable supplied with the squeezer into the power plug receptacle located on the back of the Digital Pneumatic Sand Squeezer (Figure 2, Item 4).

Some areas may require an electrical plug that is not supplied with the power cord to properly conform to the specific electrical outlet. These special electrical plugs will need to be purchased separately by the customer.

2. Verify the proper voltage of the electrical outlet before plugging the power cord into the outlet. Connect power cord to the AC electrical outlet that is free of disturbances/fluctuation and is properly grounded.

NOTICE *It is highly recommended that a voltage stabilizer/filter (line conditioner) is installed between the electrical outlet and the inlet of the Digital Pneumatic Sand Squeezer. This device will help to ensure the proper performance of the Digital Pneumatic Sand Squeezer.*

3. Assemble the provided pneumatic regulator/filter/lubricator according to the original equipment manufacturer's instructions supplied with the regulator/filter/lubricator.
4. Connect the assembled pneumatic regulator/filter/lubricator to the incoming compressed air line.
5. Connect the Digital Pneumatic Sand Squeezer to the pneumatic regulator/filter/lubricator using the pneumatic air hose and fittings included with the unit. Connect the air hose from the outlet of the regulator/filter/lubricator to the air inlet (Figure 2, Item 5) located on the back of the Digital Pneumatic Sand Squeezer. Secure the air hose to the air inlet with the provided connector that is attached to the air inlet. Fill the supplied pneumatic lubricator reservoir with pneumatic tool lubricant. Refer to the manufacturer's manual for detailed instructions.
6. Turn on the air supply. Using the supplied air regulator/filter/lubricator, adjust the air pressure to 2.4 bar (35 PSI). Refer to the manufacturer's manual for the regulator/filter/lubricator for instructions on regulating air pressure.

The squeezer has been factory calibrated prior to shipment. A calibration sticker located on the back of the instrument indicates the proper air pressure set point for the incoming compressed air. The pressure set point can also be located on the calibration sheet provided with the squeezer. This set point can vary between squeezers.

7. Adjust the oil addition rate to maintain a rate of one drop of oil every three (3) to four (4) cycles of the sand squeezer. Refer to the manufacturer's manual for the air regulator/filter/lubricator for instructions on adjusting the oil lubrication rate.

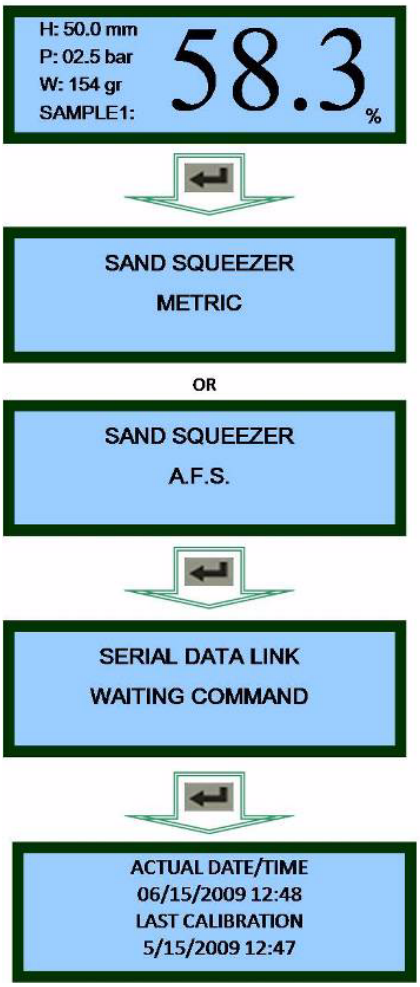
NOTICE *Failure to set the proper lubrication rate will cause damage to the sand squeezer cylinder.*

8. Calibrate the squeeze pressure as described in Section 6.2.2.

4.6 Setting the Internal Time

The Digital Pneumatic Sand Squeezer is calibrated, and the time is set just before shipment. If the unit resides in a time zone that is different than the factory, the time can be set to the proper local time.

1. Turn the machine on by pressing the Power Switch to the On position (Figure 2, Item 2).
2. The machine will begin its startup sequence and its screen will stabilize after a few seconds on the normal operating screen.
3. Press the Enter Button two times until the Actual Date/Time and Last Calibration date are displayed as shown in Graphic 1. **(Note: Values shown in Graphic 1 may differ by machine.)**



Graphic 1: Showing sequence of operation to enter into the Actual Time and Last Calibration Screen

4. Press the  Right Arrow Button until the digit that needs to be changed is underlined.
5. Press the  Down Arrow Button or  Up Arrow Button to modify the value accordingly.
6. If only one digit needed to be changed, press the  Enter Button once and it will return the machine to the operating screen. Otherwise, return to Step 4.
7. The equipment is ready to start operation.

4.7 Airborne Noise Emission

Regarding airborne noise emission by the Digital Pneumatic Sand Squeezer, Model 42160, there is no motor or other noise emitted by this machinery other than the sound of air released through the exhaust. As such, the equivalent continuous A-weighted sound pressure level at the workstation does not exceed 70db(A).

5 Operating Instructions

For more information on how to use and care for your Simpson Analytics equipment and accessories visit our Simpson Technologies channel on YouTube and search our library of videos. Subscribe to our channel to keep updated on new releases.

5.1 Changing the Sampling Location

The Digital Pneumatic Sand Squeezer is capable of storing nine (9) Sample Names and values deemed "Sample 1" through "Sample 9". These are indicated by the Sample/Location Name as shown in Figure 5.

TO CHANGE THE SAMPLE NAME:

1. Ensure that the pneumatics and power are connected and set properly.
2. Ensure the machine is turned on.
3. Ensure the compacting head and main stem are in the upmost position by lifting the Operating Valve Handle upwards until the movement of the machine stops (Figure 1, Item 3).
4. Ensure the Selection Indicator on the display is set to the Sample/ Location position as shown in Figure 5 and not the Sample weight. If the Selection Indicator is not indicating the Sample/Location Name, press the  Right Arrow Button once.
5. By pressing either the  Down Arrow or  Up Arrow Button on the Control Panel, the various Sample/Location Names modes can be cycled through.
6. Once the machine is cycled, the compactability, sample height, sample weight, squeeze pressure and sample/location name will be stored and displayed for future use.

5.2 Changing the Specimen Weight

The Digital Pneumatic Sand Squeezer is capable of storing a predetermined specimen weight value for ease of use, future reference and for the calculation of specimen weight. Information regarding the procedure for preparing a standard test specimen can be found in Section 5.4 of this manual.

TO CHANGE THE SPECIMEN WEIGHT:

1. Ensure that the pneumatics and power are connected and set properly.
2. Ensure the machine is turned on.
3. Ensure the compacting head and main stem are retracted and in the upmost position by lifting the Operating Valve Handle upwards until the movement of the machine stops (Figure 1, Item 3).

If the compacting head and main stem are not fully retracted and in the upmost position, the machine will not allow the weight to be changed.

4. Ensure the selection indicator on the display is set to the Weight position and not the Sample/Location Name (Figure 5). If the Selection Indicator is not indicating the weight, press the Right Arrow button once.
5. By pressing either the Down Arrow Button or Up Arrow Button on the control panel, the sample weight can be changed.
6. Once the machine is cycled, the compactability, sample height, sample weight, squeeze pressure and sample/location name will be stored and displayed for future use.

5.3 Compactability Testing

1. Ensure that the pneumatics and power are connected and set properly.
2. Ensure the machine is turned on.

3. Ensure the compacting head and main stem are retracted in their most upward position by lifting operating handle upwards.
4. Swab the specimen tube with a small amount of parting liquid using the tube swab.
5. Assemble the pedestal (Figure 3, Item 3a) and removable collar (Figure 3, Item 3b) by gently sliding the removable collar into the machined slot of the pedestal.
6. Insert the assembled pedestal/removable collar into the specimen tube and place the assembly under the Tube Filler Accessory (Model 42100A). Riddle prepared molding sands through the screen located on top of the tube filler accessory until sand overflows the specimen tube assembly.
7. Using the strike off bar supplied with the tube filler accessory, gently remove excess sand from the specimen tube.

Sand should be struck off from the center of the tube to the right and then to the left.

8. Gently move the pedestal and specimen tube assembly to the pedestal support on the base of the Digital Pneumatic Sand Squeezer (Figure 1, Item 7).
9. Hold the specimen tube by the lower portion with fingers away from the top of specimen tube and carefully move operating valve handle (Figure 1, Item 3) partially downward to lower the main stem and compacting head into the prepared sand within the specimen tube assembly. Once the compacting head has entered the specimen tube assembly, fully depress the operating valve handle to the full downward position until the compacting head stops moving downward into the specimen tube assembly.

Be aware of a potential pinch hazard between the top of the specimen tube and compacting head of the squeezer when lowering the main stem into the specimen tube assembly. Always keep hands and fingers clear from this area when performing a test.

A compactability test can be run with the removable collar (Figure 3, Item 3b) left in place on the pedestal (Figure 3, Item 3a) or removed. By removing the removable collar just prior to applying the final squeeze, the pressure application better duplicates the squeeze pressure of a molding machine. Whichever method is chosen, it is important that the removable collar is treated the same on all tests that follow.

10. After a moment, the digital display will flash, and the various parameters of the test will be displayed including compactability (Figure 5).
11. While holding the bottom of the specimen tube, lift the operating valve handle upwards to remove the main stem and compacting head of the squeezer from the specimen tube assembly.
12. Remove the specimen tube assembly from the pedestal support of the sand squeezer.
13. If the collar was not removed from the pedestal, remove the pedestal and collar assembly and place the specimen tube on the stripping post (Figure 3, Item 2). If the collar was removed and the pedestal is inside the specimen tube and does fall out upon removing the specimen tube from the pedestal support, simply put the entire assembly on the stripping post with the pedestal on top.
14. Gently press the prepared sand sample out of the specimen tube by exerting downward force on the specimen tube while the stripping post is firmly planted on the table or bench.
15. The test is complete.

5.4 Preparing a Standard Test Specimen

1. Ensure that the pneumatics and power are connected and set properly.
2. Ensure the machine is turned on.
3. Ensure the main stem and compacting head (Figure 1, Items 4 & 5) are retracted in their most upward position by lifting the operating valve handle upwards (Figure 1, Item 3).
4. Apply a small amount of parting liquid to the tube swab.
5. Insert the tube swab through the specimen tube several times in order to clean and properly lubricate the inner surface.

The specimen tube must be clean and lightly oiled every time a sand sample is made. A dirty or non-lubricated tube will absorb, by lateral friction, an important fraction of the compacting work delivered by the squeezer. Therefore, the resultant sample will have less strength and more permeability than one correctly prepared.

6. Assemble the pedestal (Figure 3, Item 3a) and removable collar (Figure 3, Item 3b) by gently sliding the removable collar into the machined slot of the pedestal.
7. Insert the pedestal/removable collar (Figure 3, Item 3a/b) into the specimen tube and place the assembly under the Tube Filler Accessory (Model 42100A).
8. Remove the screen from the top of the Tube Filler Accessory.
9. Weigh a sample of prepared molding sand to make a 2" x 2" (50mm x 50mm) standard sand specimen. To do this, riddle the prepared molding sand through the Tube Filler Accessory screen into an empty container. Place an empty weighing pan on top of a balance and zero the balance. Transfer the riddled molding sand to the weighing pan to achieve a predetermined sand specimen weight.

Because of different sand densities, moisture contents and other compositional differences between foundries, the amount of sand required to make a standard sand specimen can vary from foundry to foundry and from day to day. The required sample weight will need to be evaluated periodically to ensure that the sample height is within tolerances as described in Step 14 of this procedure. If you do not know the sand weight required to make a standard sand specimen, then start with approximately 165 grams and follow the procedure "Changing the Specimen Weight" in Section 5.2 of this manual to enter this starting sand sample weight into the digital pneumatic squeezer. With the starting sand weight programmed into the squeezer, the exact weight can be determined automatically by the squeezer after the first test is completed.

10. Pour the prepared sand sample through the top of the tube filler accessory and ensure that all of the sand enters the specimen tube assembly.

11. Gently move the pedestal and specimen tube assembly to the pedestal support on the base of the Digital Pneumatic Sand Squeezer.

12. Hold the specimen tube by the lower portion with fingers away from the top of specimen tube and carefully move operating valve handle (Figure 1, Item 3) partially downward to lower the main stem and compacting head into the prepared sand within the specimen tube assembly. Once the compacting head has entered the specimen tube assembly, fully depress the operating valve handle to the full downward position until the compacting head stops moving downward into the specimen tube assembly.

Be aware of a potential pinch hazard between the top of the specimen tube and compacting head of the squeezer when lowering the main stem into the specimen tube assembly. Always keep hands and fingers clear from this area when performing a test.

A standard sand specimen can be prepared with the removable collar (Figure 3, Item 3b) left in place on the pedestal or removed. By removing the removable collar just prior to applying the final squeeze, the pressure application better duplicates the squeeze pressure of a molding machine. Whichever method is chosen, it is important that the removable collar is treated the same on all tests that follow.

13. After a moment, the digital display will flash, and the various parameters of the test will be displayed (Figure 5).

14. Ensure the sample height is within specified tolerances. Normally, these are 50mm ± 0.5mm (2" ± 0.02"). If the sample is not within these tolerances, the test will have to be repeated using a different sample weight. If the starting sand sample weight was programmed into the squeezer following the procedure "Changing the Specimen Weight" in Section 5.2 of this manual, then the correct sand sample weight can be displayed after the test. To display the correctly calculated sand weight raise the main stem and compact head to their upper most position. Make certain that the “>” is pointing at “Sample” in the digital display. Then press the  Right Arrow Button and the correct sand sample weight will be shown in the digital display. This sand sample weight can then be used for the next sample to achieve a standard 2" x 2" (50mm x 50mm) sand specimen).

15. While holding the bottom of the specimen tube, lift the operating valve handle upwards to remove the main stem and compacting head of the squeezer from the specimen tube assembly.

16. Remove the specimen tube assembly from the pedestal support of the sand squeezer. If the collar was not removed from the pedestal, remove the pedestal and collar assembly and place the specimen tube on the stripping post. If the collar was removed and the pedestal is inside the specimen tube and does fall out upon removing the specimen tube from the pedestal support, simply put the entire assembly on the stripping post with the pedestal on top.
17. Gently press the prepared sand sample out of the specimen tube by exerting downward force on the specimen tube while the stripping post is firmly planted on the table or bench.
18. If the height of the prepared sand specimen was within tolerances, as described in Step 14 of this procedure, the sand specimen is ready for the next sand test such as permeability or green strength. Otherwise, if the sample was outside of the specified parameters, it should be discarded, and another sand sample prepared.

6 Maintenance and Calibration

For more information on how to use and care for your Simpson Analytics equipment and accessories visit our Simpson Technologies channel on YouTube and search our library of videos. Subscribe to our channel to keep updated on new releases.

Despite its robust construction, the Digital Pneumatic Sand Squeezer, Model 42160, is a precise mechanical/electronic measurement device and needs appropriate care.

Before performing any maintenance, turn off the Lockout air supply valve and remove the electrical power cord from the wall receptacle. The Digital Pneumatic Sand Squeezer must be put into ***Zero Mechanical State (ZMS)****. Follow* ***Lockout and Tagout*** *procedures before servicing.*

Replace all panels before operating the machine. A hazardous voltage is present, can cause electric ***shock*** *or* ***burn****, and will result in serious injury.*

6.1 Maintenance

6.1.1 Daily Maintenance

- Check the compressed air filter and drain out the condensate.
- Ensure that the oil reservoir is full of high quality pneumatic tool oil.
- Ensure that one drop per 3-4 machine cycles is dripping through the oiler sight window. If this is not the case, adjust the oiler drip rate as described in the pneumatic regulator/lubricator/filter OEM manual.
- Wipe down the machine to remove any accumulated dirt or sand.
- Remove any full or partial sand specimens from the specimen tube. Clean the internal surfaces of the specimen tube and lightly lubricate using the specimen tube swab.
- Verify that the pneumatic regulator's gauge and incoming air pressure reading on the digital display of the Digital Pneumatic Sand Squeezer are correctly set.

6.1.2 Monthly Maintenance

- Verifying the calibration of the linear transducer (height measurement) as described in Section 6.2.4 of this manual.

6.1.3 Quarterly Maintenance (4 times per year)

- All of the procedures stated in Section 6.1.1 should be performed.
- The squeeze pressure should be calibrated as described in "Calibrating Squeeze Pressure" Section 6.2.2.
- The pressure transducer should be calibrated as described in "Calibrating the Pressure Transducer" Section 6.2.3.
- The linear transducer (height measurement) should be calibrated as described in "Calibrating the Linear Transducer" (Height Measurement) Section 6.2.5.

6.2 Calibration

The periodic calibration of the Digital Pneumatic Sand Squeezer by the user requires the possession of the Calibration Kit, Model 42113, or individual calibration accessories (Section 6.2.1). If the user does not have the kit or the necessary pieces, the apparatus should be sent periodically to the manufacturer, or a technical service engineer should be requested.

6.2.1 Calibration Accessories

Mechanical Load Cell

The gauge is calibrated using NIST certified dead weights at three positions. Each mechanical load cell is supplied with certification documentation. Using this mechanical load cell, the Digital Pneumatic Sand Squeezer can be calibrated in minutes.

Part No. 0042125

Specifications	Mechanical Load Cell (Approximate)
Length	191 mm (7.5”)
Width	102mm (4”)
Height	25 mm (1”)
Weight	1 kg (2.2 lbs.)

Supports for Calibration

The supports allow the Model 42125 Mechanical Load Cell to be mounted directly on the pedestal support and main stem of the Model 42160 or Model 42117 Sand Squeezers.

Part No. 0017-721

Specifications	Supports
Diameter	ca. 50 mm (2”)
Height	ca. 50 mm (2”)
Weight (Total)	ca. 0.5 kg (2.2 lbs.)

6.2.2 Calibrating Squeeze Pressure

This procedure requires the Mechanical Load Cell, Part No. 0042125, and the Supports for Calibration, Part No. 0017-721.

1. Ensure that the compacting head (Figure 1, Item 5) and main stem (Figure 1, Item 4) are retracted to their uppermost position by lifting the operating valve handle (Figure 1, Item 3).
2. Remove the compacting head from the main stem of the sand squeezer. To remove the compacting head, loosen the Allen screw located on the compacting head and rotate the compacting head counterclockwise (see Figure 6).
3. Screw the upper load cell support onto the main stem of the sand squeezer (see Figure 7).
4. Clean any loose dirt or sand from the surface of the pedestal support (Figure 1, Item 7) of the pneumatic squeezer.
5. Gently place the lower load cell support onto the pedestal support (see Figure 8 showing both the upper and lower load cell supports correctly mounted on the sand squeezer).
6. Using the regulator/filter/lubricator reduce the incoming air pressure to approximately 2.0 bar.
7. Rotate the bezel on the Mechanical Load Cell, Model 42125, to zero.

8. While holding the mechanical load cell in an upright position (see Figure 9), place the lower pivot point of the mechanical load cell into position on the point of the lower load cell support and very slowly lower the upper load cell support and main stem using the operating valve handle (Figure 1, Item 3). Gently guide the point of the upper load cell support into the proper position on the upper pivot point of the mechanical load. Keep your hands clear of the upper pivot point of the mechanical load cell and upper load cell support while lowering the main stem. Continue to very slowly lower the main stem of the squeezer until there is a slight deflection shown on the deflection gauge of the mechanical load cell. Manually rotate the mechanical load cell on the pivot points between the upper and lower load cell supports to ensure that the mechanical load cell is properly seated.

Be aware of a potential pinch hazard between the upper and lower load cell supports and the top and bottom surfaces of the mechanical load cell. Always keep hands and fingers clear from this area when performing this calibration.

9. From the mechanical load cell calibration sheet that was supplied with the load cell, determine the proper deflection on the load cell for the desired squeeze pressure.

The standard AFS pressure setting is 140 psi.

Refer to the calibration certificate supplied with the mechanical load cell for detailed instructions and calculations required to determine the proper deflection value (measured in 0.01 mm) to achieve 140 psi load for the mechanical load cell. This calculated value indicates the deflection in 0.01 mm that the mechanical load cell must move to achieve the force required.

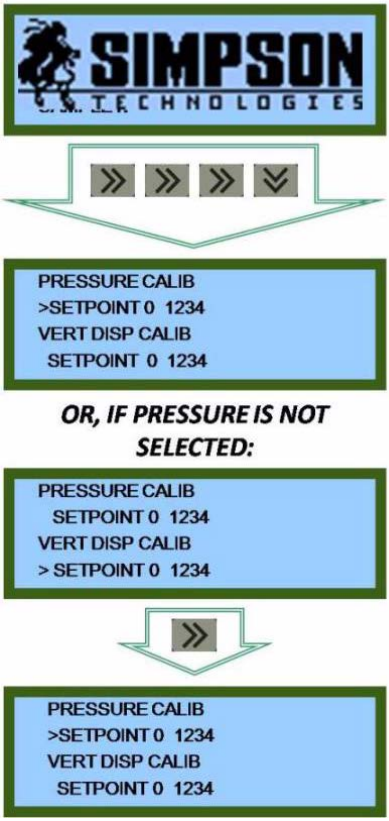
10. While fully depressing the operating valve handle (Figure 1, Item 3), slowly increase the incoming air pressure using the regulator/ filter/lubricator until the calculated deflection value is achieved on the dial indicator gauge of the mechanical load cell.

11. Note the regulator pressure value and the incoming air pressure as displayed on the digital display (Figure 5). This is the correct squeeze pressure set point to achieve 140 psi on the sand specimen. This is the pressure set point that should be used for all future tests.
12. While holding the mechanical load cell gently lift the operating valve handle (Figure 1, Item 3) to fully retract the upper calibration support and main stem of the sand squeezer to its upper resting position.
13. Gently remove the mechanical load cell from the lower load cell support.
14. Remove the lower load cell support from the pedestal support of the sand squeezer.
15. Remove the upper load cell support from the main stem by rotating it counterclockwise.
16. Reinstall the compacting head (Figure 1, Item 5) by turning it clockwise on the main stem until it is hand tight.
17. Tighten the Allen screw in the compacting head to secure it to the main stem.
18. The calibration is complete.

6.2.3 Calibrating the Pressure Transducer

1. Ensure that the pneumatics and power are connected and operating properly.
2. Ensure the machine is turned on.
3. Ensure the compacting head and main stem are retracted in their most upward position by lifting operating handle upwards (Figure 1, Item 3).
4. Turn the machine off.
5. Wait 5 seconds.
6. Turn the machine on.
7. Immediately, while a logo is present, quickly press the  ,  Right Arrow Button and the  Down Arrow Button as shown in Graphic 2.

If the machine goes to the normal screen and not the calibration screen, the keys were not pressed fast enough, and Steps 4-7 will have to be repeated.



Graphic 2: Showing sequence of operation to enter into calibration menu after start-up (Note: Values shown are examples and do not necessarily reflect the values on the unit)

1. Set the pressure regulator to 1 bar of pressure as indicated on the pressure gauge on the regulator.
2. Press the Up Arrow Button to accept this value for SET- POINT 0 which is equivalent to 1 bars of pressure in the air cylin- der and on the display.
3. Set the pressure regulator to 3 bars of pressure as indicated on the pressure gauge on the regulator.

4. Press the Up Arrow Button to accept this value for SET- POINT 1 which is equivalent to 3 bars of pressure in the air cylin- der and on the display.
5. Press Enter Button several times passing by the other menus until the normal home screen comes up.
6. The squeeze pressure now needs to be calibrated per Section 6.2.2.

6.2.4 Verifying the Calibration of the Linear Transducer (Height Measurement)

A simple and quick check with the calibration block will determine if the linear transducer is in need of calibration as described in this section.

This procedure requires one (1) 50mm Calibration Block and five (5) 10mm Calibration Blocks - included with Digital Pneumatic Sand Squeezer.

1. Ensure that the pneumatics and power are connected and operating properly.
2. Ensure the machine is turned on.
3. Ensure the compacting head and main stem are retracted in their most upward position by lifting operating handle upwards (Figure 1).
4. Place the 50mm calibration block on the pedestal as shown in Figure 10.
5. Depress the control handle downwards until compacting head is stopped against the 50mm calibration block.

Be aware of a potential pinch hazard between the top of the calibration block(s) and compacting head of the squeezer when lowering the main stem onto the top surface of the calibration block(s). Always keep hands and fingers clear from this area when performing this calibration.

6. Read the value of the Sample Height. This should read 50.0 +/- 0.2mm. If it does not, skip the following steps and move to Section 6.2.4.

7. Retract the compacting head by lifting the control handle upwards until the compacting head is in its upmost position.
8. Place one of the 10mm calibration block on the 50mm calibration block as shown in Figure 10.
9. Depress the control handle downwards until compacting head is stopped against the 10mm calibration block as shown in Figure 11.
10. Read the value of the Sample Height. This should read 60.0 ±0.2mm. If it does not, skip the following steps and move to Section 6.2.5.
11. Retract the compacting head by lifting the control handle upwards until the compacting head is in its upmost position.
12. Repeat Steps 8 through 10 until all five of the 10mm calibration blocks are checked with the Sample height increasing 10mm ±0.2 each time.
13. If each reading was within ±0.2 mm each time, the unit is within calibration and the linear transducer does not further adjustment as described in the next section.

6.2.5 Calibrating the Linear Transducer (Height Measurement)

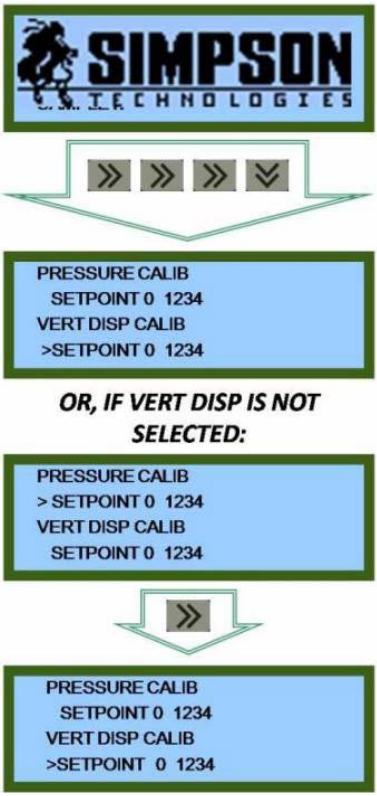
This procedure requires one (1) 50mm Calibration Block and five (5) 10mm Calibration Blocks - Included with Digital Pneumatic Sand Squeezer.

The internal linear transducer measures the compacting head's height and feeds this signal into the logic controller. This signal is then translated into a digital reading for reference.

1. Ensure that the pneumatics and power are connected and operating properly.
2. Ensure the machine is turned on.
3. Ensure the compacting head and main stem are retracted in their most upward position by lifting operating handle upwards (Figure 1, Item 3).
4. Turn the machine off.
5. Wait 5 seconds.

6. Turn the machine on.
7. Immediately, while a logo is present, quickly press the », » , » Right Arrow Button, and the » Down Arrow Button as shown in Graphic 3.

If the machine goes to the normal screen and not the calibration screen, the keys were not pressed fast enough, and Steps 4-7 will have to be repeated.



Graphic 3: Showing sequence of operation to enter into calibration menu after start-up (Note: Values shown are examples and do not necessarily reflect the values on the unit)

8. Place the pedestal and collar assembly on the pedestal support.
9. Place the 50mm calibration block on the pedestal as shown in Figure 10.
10. Depress the control handle downwards until compacting head is stopped against the 50mm calibration block.
11. Press the Up Arrow Button to accept this value into SETPOINT 0. Note: the value on SETPOINT 0 will fluctuate slightly.

Be aware of a potential pinch hazard between the top of the calibration block(s) and compacting head of the squeezer when lowering the main stem onto the top surface of the calibration block(s). Always keep hands and fingers clear from this area when performing this calibration.

12. Retract the compacting head by lifting the control handle upwards until the compacting head is in its upmost position.
13. Place one of the 10mm calibration block on the 50mm calibration block as shown in Figure 10.
14. Depress the control handle downwards until compacting head is stopped against the 10mm calibration block as shown in Figure 11.
15. Press the Up Arrow Button to accept this value into SETPOINT 1. Note: The value on SETPOINT 1 will fluctuate slightly.
16. Retract the compacting head by lifting the control handle upwards until the compacting head is in its upmost position.
17. Repeat Steps 13 through 16 until all five of the 10mm calibration blocks are completed as shown in Figure 12.

After the last calibration block is accepted into the machine as SETPOINT 5, the display will default back to SETPOINT 0.

18. Retract the compacting head by lifting the control handle upwards until the compacting head is in its upmost position.
19. Press Enter Button several times, passing by the other menus, until the normal home screen comes up.
20. Calibration of the linear transducer (height measurement) is now complete, and the machine is ready for use.

7 Apparatus Layout

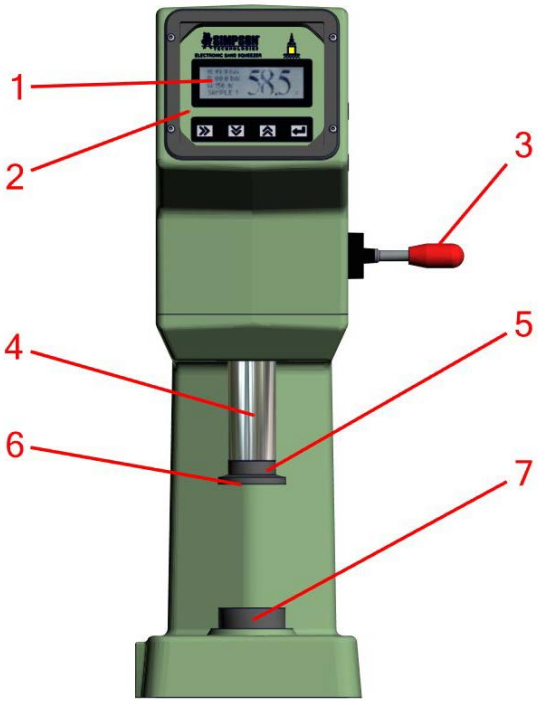


Figure 1: Front View

Item	Description
1	Display Panel
2	Control Panel
3	Operating Valve Handle (Up/Down)
4	Main Stem (Extended)
5	Compacting Head (Extended)
6	Set Screw (In Compacting Head)
7	Pedestal Support

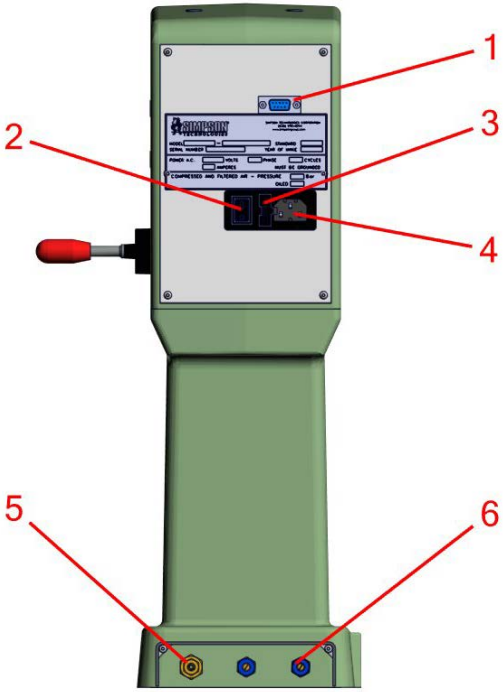


Figure 2: Rear View

Item	Description
1	R232 Port
2	Power Switch
3	Fuse Holder
4	Power Cord Receptacle
5	Compressed Air Inlet
6	Flow Controls and Vent

Figure 3: Included Accessories

Item	Description
1	Specimen Tube
2	Stripping Post
3a	Pedestal
3b	Removable Collar
4	50mm Calibration Block
5	10mm Calibration Blocks (5)
6	Tube Swab

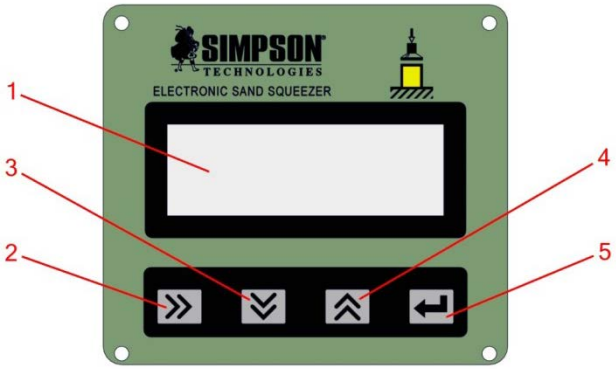


Figure 4: Control Panel Detail

Item	Description
1	Display Panel
2	Right Arrow Button
3	Down Arrow Button
4	Up Arrow Button
5	Enter Button

Figure 5: Display Panel Detail

Item	Description
1	Sample Height
2	Incoming Air Pressure
3	Sample Weight
4	Selection Indicator
5	Sample/Location Name
6	Compactability Value

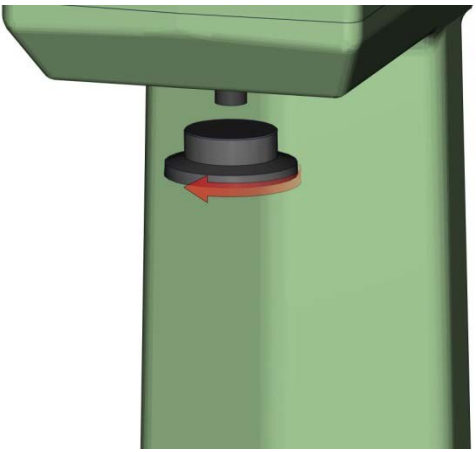


Figure 6: Removal of the compacting head from the main stem (removal > counterclockwise)

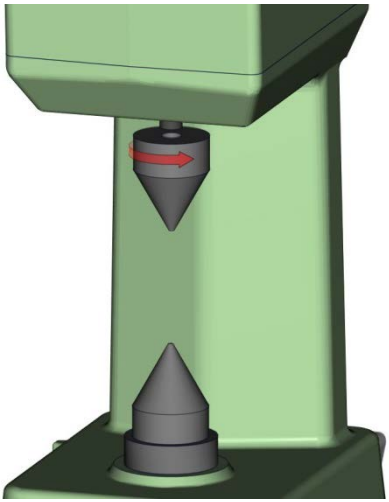


Figure 7: Installation of upper support for calibration onto the main stem (installation > clockwise) with the lower support already inserted into the pedestal support

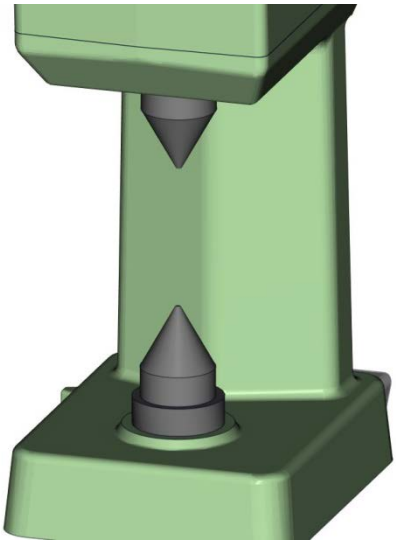


Figure 8: Upper and lower supports for calibration installed

Figure 9: Mechanical load cell slightly compressed between the upper and lower supports

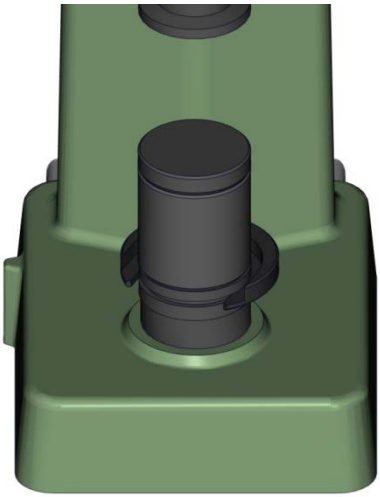


Figure 10: 10mm calibration block stacked on 50mm calibration block and pedestal and collar on pedestal support

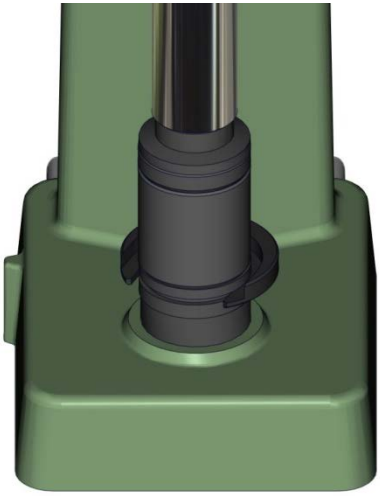


Figure 11: Compressing the 10mm calibration block, 50mm calibration block, pedestal and collar onto the pedestal support

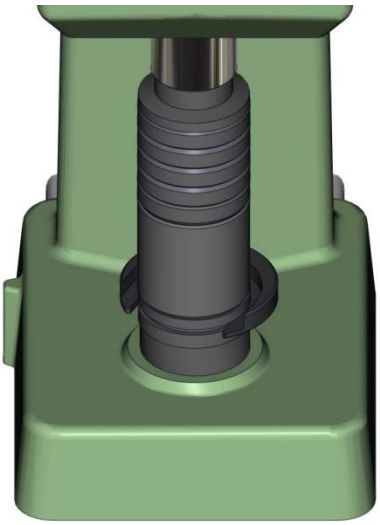


Figure 12: Compressing five (5) 10mm calibration blocks and one (1) 50mm calibration block, pedestal and collar onto the pedestal support

8 Parts List / Ordering Parts / Returns

8.1 Spare Parts List

Simpson maintains a large inventory of common spare parts for all current Simpson Analytics products. The following table provides part numbers for common spare parts for this device. Contact Simpson Technologies with the part number and description when ordering.

Part No.	Description
0045628A	Specimen Tube
0045628M	Specimen Tube - Metric
217100	Pedestal - AFS
217101	Pedestal - Metric
217102	Removable Collar - AFS/Metric
0045623A	Stripping Post - AFS
0045623M	Stripping Post - Metric
0042100J	Specimen Tube Cleaning Swab
216900	10mm Calibration Block (Set of 5)
208600	50mm Calibration Block

8.2 Ordering Replacement / Spare Part

The source of replacement parts for your Simpson Analytics equipment is just as important as the make of the equipment you purchase. ALWAYS order parts for your Simpson Analytics equipment directly from Simpson Technologies. To find the Simpson office closest to you please visit us on the internet at www.simpsongroup.com on the “Contact Us” page.

Parts may be ordered from the sales department via e-mail at parts@simpsongroup.com: When contacting our sales department to obtain a quotation on replacement parts or service please always include the equipment serial number, the description of the part and the part number. Your Simpson Technologies sales team representative will provide you with a quote on the items with current price and delivery times. When ordering, please always refer to the quote number on your order.

To arrange for calibration support or repair assistance please contact our customer service department at service@simpsongroup.com.

8.3 Returned Goods Policy

Simpson Technologies strives to provide their customers with maximum follow up support and, in order to offer the most practical flexibility, the following conditions apply to returned goods. Adherence to these procedures will assure the most prompt and efficient service.

RETURNS WILL BE CONSIDERED IN THE FOLLOWING SITUATIONS:

- Products ordered in error by customer (subject to a restocking charge).
- Incorrect or defective products shipped to customer.
- Repair or upgrade of existing products.
- Products ordered correctly but which are unwanted or unsuitable (subject to a restocking charge).
- A Safety Data Sheet (SDS) must accompany material that is sent to Simpson Technologies for testing purposes. Simpson Technologies will NOT authorize the return of hazardous materials.

RETURN PROCEDURE :

- **The customer must obtain a Return Material Authorization Number (RMA#) from Simpson Technologies prior to returning the goods.**
- To obtain an RMA#, the customer should contact the Customer Service department by phone, fax, e-mail to service@simpsongroup.com. The material being returned must be identified and the reason for its return clearly specified. Once approved for return, Simpson Technologies will issue the customer an RMA form to be included with the shipment and with instructions on where and how to ship the goods.
- All returned goods are to be shipped with transportation charges PREPAID, unless otherwise agreed when the RMA# is assigned. If it has been predetermined that return goods are to be shipped COLLECT, Simpson Technologies will specify the desired routing.
- All returned shipments will be subject to inspection upon arrival at Simpson Technologies.
- Material returned without an RMA# may be refused and returned at customer's expense.

9 Decommissioning

*Before doing any work, review the Safety Procedures in Section 2 and **Lockout/Tagout** all the power sources to the machine and peripheral equipment.*

Failure to follow safety procedures could result in serious injury.

Use qualified personnel and follow safety procedures, applicable local policies and regulations in decommissioning the Digital Pneumatic Sand Squeezer and peripheral equipment.

Electrical Power: Disconnect the electrical power source and verify there is no power on all components being decommissioned.

Air Supply: Shut off all plant airlines supplying air to the pneumatic components and bleed the down stream air lines before dismantling.

WASTE DISPOSAL

The machinery and controls consists of:

- Iron
- Aluminum
- Copper
- Plastic
- Electronic components and circuit boards

Dispose of the parts in accordance with the applicable regulations.

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