

Operating Instructions

Gas Pressure Measuring Device

Model PGD-E



Type:

Gas Pressure Measuring Device

Model:

PGD-E

Part No.:

592-806-850

Serial Number:

Name and address of manufacturer:

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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 Gas Pressure Measuring Device 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

This device is intended exclusively for measuring the gas pressure of test samples consisting of foundry sand. Usage of other materials may be possible upon consultation with the Technical Service 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 hereunder. The risk in this case will be exclusively that of the user.

1 Introduction

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 Safety

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 indicates a potentially hazardous situation which, if not avoided, could or may result in death or minor to serious injury.

NOTICE

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 lower right corner of the Heating Housing front cover (front left of machine).

With the front electrical or any other panels 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.



BURN HAZARD/HOT SURFACE

(STC #217974)

This label is located on the top of the Heating Housing unit.

When the Tester is ON, the Heater (Item 6, Figure 7.4) is extremely **hot** and can cause severe **burn** to body parts. Also, the Quartz Tube is extremely **hot** during and after the test sequence. Direct contact with this tube can also cause severe **burn** to body parts. 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 top left corner of the Heating Housing.

Before operating and/or performing any maintenance or repair on Simpson Technologies GmbH 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 GmbH 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 or mechanical maintenance, the equipment must be rendered into **Zero Mechanical State (ZMS)**.*

Prior to maintenance (routine or otherwise) or repair of equipment, a safety procedure should be established and maintained. This procedure should include: training of all personnel involved with the equipment; 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 Safety

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 a 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 or pieces of equipment, machinery or system. These individuals 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 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.

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 properly 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 Fundamental Principles

The success of castings is largely dependent upon the gas pressure and the generation time of the sand. During the pouring process, the cores and mold come into contact with liquid metal and are rapidly heated to high temperatures. As the temperature increases, the pressure inside the core increases due to the growing volume of core gas generated. The removal of these hot gases, via the core structure, is hindered by the mold. If the quantity of gas reaches a level where it can no longer be vented by the permeability of the sand, the gas can be forced into the liquid metal and cause defects in the casting (e.g. porosity). Due to this impact of the core gas on the casting between the start of pouring and solidification, generation time is also an important variable. To avoid casting defects, measurement of the gas pressure and judgement of generation time is extremely important to the metal caster.

3.2 Description

The Gas Pressure Measuring Device, Model PGD-E, is designed to accurately measure the gas pressure from foundry sands. This device is especially suitable for direct application in the foundry.

The Gas Pressure Measuring device, Model PGD-E, creates accurate measurements of the gas pressure by heating a sand sample and recording the gas pressure over time.

3.3 Specifications, Dimensions and Weights (Approximate)

Specifications	Gas Pressure Measuring Device (Model PGD-E)
Length	Without carrying handles: 535 mm (21.1 in.)
Width	200 mm (7.9 in.)
Height	290 mm (11.4 in.)
Weight	25 kg (55 lbs.)
Power	230 V; 50 Hz
Current Consumption	2.4 A

4 Unpacking and Installation

4 Unpacking and Installation

4.1 Unpacking

NOTICE

Your new laboratory equipment has been closely 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 Gas Pressure Measuring Device, Model PGD-E, is shipped in one piece and is intended to be used as received; no further assembly/disassembly is required. No lifting equipment for handling is required. The machine weighs approximately 25 kg. 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 535 mm x 200 mm x 290 mm. Its shipping weight (in a box) is about 30 kg.



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 within the shipping crate and place in a location away from any packaging material to ensure that these items are not misplaced.
2. Carefully remove the tester from the packaging crate and place on stable bench.
3. Once removed from the crate, proceed by taking off any protective wrap and packaging from the tester and 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 Gas Pressure Measuring Device is shipped with the following accessories and installation components. Please take a moment and identify that the following items were included. See Figure 4.2.1 for included accessory components (showing Items 3 – 14).

1. Gas Pressure Measuring Device
2. Operating Instructions Manual
3. Measuring Tube, Straight Hose (Soft Nylon Hose)
4. Measuring Tube, Spiral Hose (Soft Nylon Hose)
5. Plug Coupling (2)
6. Quartz Glass Tube (10)
7. Glass Funnel
8. Test Glass Brush
9. Sample Holder
10. Quartz glass tube Support
11. Power Supply Cable
12. Monitor Cable (USB Cable)

13. ADS16DAN Software (Flash Drive)

14. Carrying Case



Figure 4.2.1

All accessory components (Items 3 – 13, Figure 4.2.1) are shipped together in a gray Carrying Case (Item 14, Figure 4.2.1).

If any of the above components are missing, contact your local Simpson Technologies office. See Figure 7.1 - Figure 7.5 for apparatus layout and components.

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.

In order to guarantee effective performance, a solid surface that is free of vibrations is recommended. Vibrations can disrupt the machine's proper operation and give false pressure readings. Care should be taken to make certain that the tester is not placed on a surface that also includes instruments such as laboratory sifters or mullers.

The apparatus should be placed on a stable bench and should be in level condition.

The left side of the Gas Pressure Measuring Device contains a heating element with an integrated fan. For this reason, the device must not be operated in a box or contained environment. The apparatus must have a minimum side clearance of 100 mm, and minimum height clearance of 500 mm. In order to guarantee the circulation of air, the apparatus must have a clearance below of at least the distance provided by the rubber feet.

The Gas Pressure Measuring Device is intended for operation for one operator at a time in a foundry sand laboratory. It is intended to be used in conjunction with a computer capable of running ADS16DAN Software (software included). The machine should be placed at an ergonomically correct position and height to allow the operator to comfortably handle the Measuring Tube, controls operation, and measurement observation.

The Measuring Tube is shipped detached from the PGD-E apparatus. To connect the Measuring Tube, press the end opposite of the Plug Coupling into the press-fit coupling (Item 8, Figure 7.4) on the top of the PGD-E apparatus.

4 Unpacking and Installation

4.4 Electrical and Computer Power Connection

Electrical Requirements: 230 Volts, 50 Hz

Computer Requirements: Computer with a serial communication (COM) connection, operating system capable of installing and running ADS16DAN software, and clear display for measurement reading.



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.



The communication cable required to connect the Gas Pressure Measuring Device to a computer, and the software required to run the test have been included with the Gas Pressure Measuring Device. Newer computers may not have a COM connection port. In this case, a USB-serial converter (or similar converter) may be necessary (not supplied) to connect the computer to the Gas Pressure Measuring Device.

4.5 Connecting Power and Set-Up

1. Verify the voltage on the specification plate located on the back of the Gas Pressure Measuring Device, Model PGD-E. Connect the power cable supplied with the machine into the power plug receptacle located on the back of the Gas Pressure Measuring Device (Item 12, Figure 7.5).



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 to the AC electrical outlet that is free of disturbance/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 Gas Pressure Measuring Device. This device will help to ensure proper performance of the machine.

3. On the back of the machine, the two power cords are disconnected for shipping. Connect the loose ends of the power cords to the back of the Heating Housing (Item 1, Figure 7.1). Ensure that the “Heating/Fan” cord is connected from the Control Housing (Item 13, Figure 7.5) to the “Heating/Fan” connection on the Heating Housing (Item 15, Figure 7.5) and that the “Temperature Probe” is connected from the Control Housing (Item 14, Figure 7.5) to “Temperature Probe” connection on the Heating Housing (Item 16, Figure 7.5). (The connections are labeled accordingly on the back of the machine).
4. Connect the supplied monitor COM cable (Item 12, Figure 4.2.1) to the port labeled, “PC Monitor” (Item 11, Figure 7.5) on the back of the Control Housing unit. Connect the opposite end to the desired computer display.

4.6 Software Installation

1. Place the supplied storage media in the corresponding drive on the operating computer. If the installation window does not start automatically, it can be started by running it through Windows.
2. Locate and select the “ADS16DAN” Windows Installer Package.

4 Unpacking and Installation

3. The software setup process will now begin. The ADS16DAN software setup will prepare the Installation Wizard, and display a window welcoming the user.
4. When the installation window appears, follow the on-screen instructions, which will guide you through the remainder of the installation process.

4.7 Setting the Com# Port to Communicate to the PC

Set the proper USB Serial Port (COM # port) to communicate the equipment to the PC, the COM port cannot be higher than the number 8.

1. The PGD-E equipment should be turned on and the USB cable will need to be connected between the equipment and the PC.
2. Press the Windows button and the Pause button on your keyboard at the same time. This will open the Control Panel Window.
3. In the upper left of the control panel screen select the “Device Manager” it will need to be selected by using the mouse and left click once.
4. Then a warning device manager window will appear, click “OK”.
5. The Device Manager Window will be open and show all the files available from there you can find and select the “Ports (COM & LPT)” that will need to be expanded.
6. The expanded “Ports (COM & LPT)” file may have several items to view. The COM port for the PGD must be selected, if this is not known then disconnect the USB cable at the PC. One of the selections will no longer be visible (remember the COM #). Reconnect the USB cable to the USB port on the PC, and then the COM Port will be available for selection. Our example is seen on the port (COM10).

7. Select the COM# port recognized for the PGD-E (our example “COM10”) and right on the mouse, a small window will appear. Select “Properties”.
8. The USB Serial Port Properties window will open; you will need to click on the “Port Settings” tab. Next select “Advanced” (it’s important that you have the USB contact to the computer).
9. In the Advanced Settings window of the COM port you selected (9- or higher number), you will need to select a COM port that is available in the 1-8 COM port range of the drop down box for “COM Port Number”. Click “Ok” at the top right of the window.
10. Click “Ok” again on the next window.
11. Return to the Device Manager window (previously opened) and verify the COM port that was selected at the beginning has changed to the new selection.
12. Close the Device Manager Window.
13. Proceed to the Software Operation section.

4.8 Airborne Noise Emission

Regarding airborne noise emission by the Gas Pressure Measuring Device, Model PGD-E, there is no motor noise with this machine, only a dull sound from the heater and clicking of a solenoid valve. As such, the equivalent continuous A-weighted sound pressure level at the workstation does not exceed 70dB(A).

5 Operating Instructions

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.



The Gas Pressure Measuring Device's Heater is extremely hot when the tester is in operation. Always wear gloves and use caution when working around the tester or samples. **Hot** surfaces can **burn** hands and body parts

5.1 Software Operation

1. Ensure that the computer is connected to the proper port on the Gas Pressure Measuring Device via the supplied communication cable.
2. Start the program. One method of completing this by clicking "Start" – "Programs" – "ASD16DAN."
3. The user interface screen should now be displayed. Various settings can be configured on the left side of the screen. (See Figure 5.1.1).
4. Ensure that the proper COM port is selected. Select the COM port with the dropdown list in the center of the left toolbar on the opening screen (Item 6, Figure 5.1.1).
5. Establish a connection with the Gas Pressure Measuring Device. This is accomplished by clicking the "Search" button at the top of the left toolbar on the opening screen (Item 1, Figure 5.1.1). Once the connection is established, the Logger number and Scale are displayed on the screen.

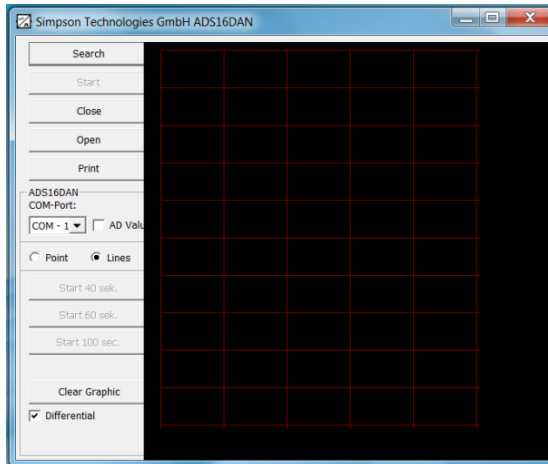


Figure 5.1.1

5.1.1 Initial Toolbar Menu

1. **Search:** This button allows the operator to search for a machine connection. This feature should be utilized as soon as the software program is opened (see Section 5.1 for software operation process).
2. **Start:** This button allows the operator to start the measurement process without a specific time frame. As soon as this button is pressed, the operator will be prompted to save the file. Specify location and name of the test results and click “Save.” The measurement process will begin as soon as the light sensor is activated. The recording of the measurement curve begins. The test will continue until the Quartz Tube is removed from the Heater or the “Stop” button is pressed.
3. **Close:** This button will close the program completely. Work should be saved before this command is executed.

5 Operating Instructions

4. **Open:** This button allows previously saved data to be displayed. After pressing it, select the desired file and click “Open” to view the curve. A maximum of five curves can be displayed at one time. The curves are shown in the following colors:

Curve Number	Color Pressure	Color Differential
1	green	blue
2	red	yellow
3	violet	light blue
4	green	blue
5	red	yellow

5. **Print:** This button prints the data curve(s) displayed on the current screen. After clicking, a window is displayed for printer settings. Proper printer configuration is required separately.
6. **ASD16DAN COM-Port:** This drop down menu allows for the selection of the proper COM port which is connected to the PGD-E via monitor cable. This should be completed when initially opening the software (see Section 5.1 for software operation).
7. **AD Values:** This check box permits toggling between Analog (millibar) and Digital display. Checking this box will show measurement values digitally, instead of in millibars. In standard operation, the control box should not be selected (analog display turned on).
8. **Point / Lines:** This selection point allows for the choice of curve display. The line selection draws the curve as a continuous line. Point draws the line as a series of dots. Curves recorded previously may also be redrawn.

9. **Start 40 sec. / 60 sec. / 100 sec.:** These buttons have the same function as the “Start” button; however, they record with a pre-set measuring time. Rather than test until the “Stop” button is pressed, these buttons will measure until the specified amount of time has passed. Like the standard “Start” button, these tests will also stop if the Quartz Tube is removed.
10. **Clear Graphic:** This button deletes all curves displayed on the screen. In order to perform additional measurements, a connection to the PGD-E must be re-established (see Section 5.1 for software operation).
11. **Differential:** This check box allows for the choice of differential curve display. The differential curve shows the steepness of the pressure curve. This may aid in the clarity of gas impact from the measurements.

5.2 Preparing the Test samples

1. Place a clean Quartz Tube in the Tube Support and set the Glass Funnel on top of the Quartz Tube.
2. Weigh one gram (± 0.01 g) of test sand and pour into the Quartz Tube. Considering the small quantity of test sand, ensure that the complete measured quantity is placed into the tube.



Because the measurement is carried out in a closed system, the measured result is dependent on quantity and type of sand used. Varying quantity and type of sand will impact the gas volume and, therefore, the gas pressure. The volume of the system is dependent on the Measuring Tube. If the Measuring Tube is altered, (e.g. shortening or using the Spiral Tube), the measurement results cannot be accurately compared to each other.

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If using the Spiral Hose, samples of two grams (± 0.02 g) may be used; however, changes in sample size will alter gas volume and pressure. Therefore, varying sample sizes may not be accurately compared with one another.

3. It is recommended that three test samples are weighed out and measured. Taking the average gas pressure of three sample measurements will reduce variation and provide more accurate results.
4. The prepared test samples may be stored on the Test Tube Support (Item 17, Figure 7.5) on the rear *right* side of the apparatus (behind the Control Housing). Up to four samples may be stored in that location. The Test Tube support (Item 18, Figure 7.5) on the *left* (behind the Heating Housing) should not be used for prepared test samples (before measurements) because waste heat from the heater may alter the sand and impact measurements (see Figure 5.2.1 for placement of prepared samples). The left side should be used to store samples that have already been tested.



The prepared test samples should be measured as quickly as possible after preparation. Lengthy interruptions and time variance between preparation and measurement can also impact measurements.

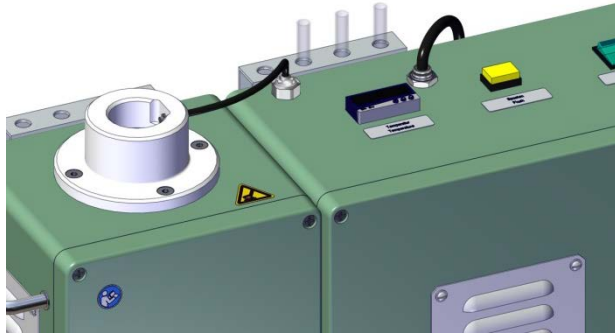


Figure 5.2.1

5.3 Performing a Gas Pressure Measuring Test



BURN HAZARD! The Gas Pressure Measuring Device's Heater is extremely hot when the tester is in operation. Always wear gloves and use caution when working around the tester or samples. Extreme caution must be observed when loading and unloading the Quartz Tube in the Heater due to the high temperature present at the Heater. **Hot surfaces can burn hands and body parts.**

1. Turn the Gas Pressure Measuring Device on by pressing the green switch labeled, "Master Switch" (Item 10, Figure 7.4).
2. The Heater will activate, taking about 10 minutes to reach the target temperature (850°C in a standard test). Ensure that the target temperature is set to the desired temperature (850°C standard) by clicking the "P" button on the "Temperature" control (Item 7, Figure 7.4) and using the arrows to move the temperature up or down. The range of temperatures is 0 - 1000°C.
3. Start the ADS16DAN software on the computer and establish a connection to the data logger (see Section 5.1 for software operation).

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4. After about 10 minutes when the target temperature is reached, select one of the start options from the computer display to initiate measurement (see Section 5.1.1 for Initial Toolbar Menu options).
 - **Start 40 sec. / 60 sec. / 100 sec.:** Selecting one of these options will measure the gas pressure in the sample with the pre-set measuring time. The measurement will begin with the button selection on the ADS16DAN software and end with either the selected time limit or removal of the Quartz Tube from the Heater.
 - **Start:** Selecting this option will measure the gas pressure in the sample without a pre-set measuring time. The measurement will begin when the light sensor is activated by the Quartz Tube and will end when either the “Stop” button is pressed or when the Quartz Tube is removed from the Heater.



When performing a Gas Pressure Measuring Test for the first time, different start possibilities should be executed to determine the most suitable fit for the operator’s purpose.

5. Place the Coupling end of the Measuring Tube on a prepared Quartz Tube test sample. Ensure that the Measuring Tube is plugged snugly onto the Quartz Tube to avoid leakages (see Figure 5.3.1). There will be a small click when the Plug Coupling is fully connected.



The Spiral Hose may be substituted for the standard Measuring Tube if the pressure in the standard tube exceeds 500 mb during the gas pressure measurement. (Spiral Hose installation is identical to the Measuring Tube installation in Section 4.3). Alternatively, the quantity of sand used in the standard Measuring Tube may be reduced to obtain a pressure measurement under 500 mb.



Figure 5.3.1

6. Insert the Quartz Tube, with the Measuring Tube attached, into the white Heating Protection Collar located on the left side of the apparatus. (See Figure 5.3.2).



It is suggested that the Quartz Tube is held for about 1 second directly against the light sensor (located on the right side of the Heater Protection Collar). This will trigger the measurements to start, but will not increase the pressure in the tube. By utilizing this technique, the resultant curve will be horizontal for the duration of time the Quartz Tube is held at the light sensor. The beginning of the measurement curve will therefore be separated from the left edge of the graph display and be much easier to evaluate.

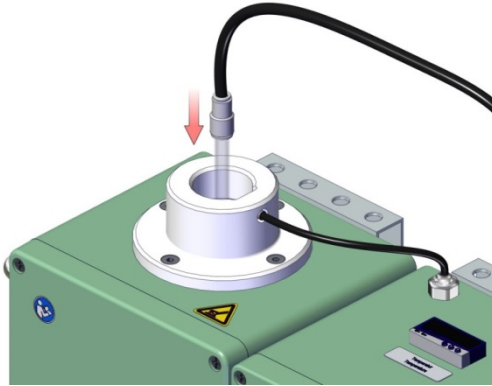


Figure 5.3.2

7. Press the Quartz Tube into the Heater Protection Collar (Item 6, Figure 7.4) until it reaches the bottom of the Heater. The measurement readings will now start recording on the display.
8. The measuring program runs for the selected time on the program toolbar, until the “Stop” button is pressed, or until the Quartz Tube is removed from the Heater. (See Step 4 of Section 5.3 for testing options.) The measurement will conclude thereafter. (See Figures 5.3.3 and 5.3.4).

NOTICE

Do not exceed a measurement duration of 100 seconds at 850 °C or 60 seconds at 1000 °C. Doing so will put the Plug Coupling at risk from melting damage.

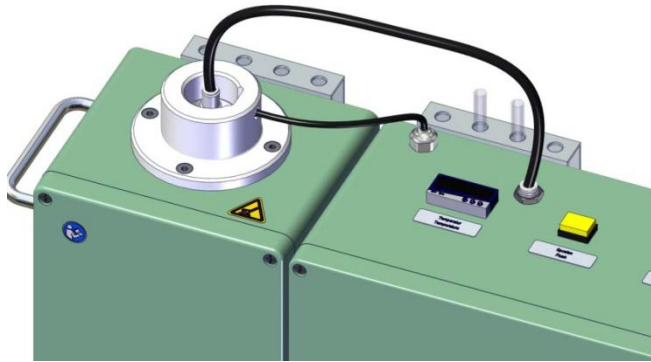


Figure 5.3.3



Figure 5.3.4

- At the conclusion of the measurement, the Quartz Tube should be removed from the Heater. (The measurement ends after the selected time limit is reached, after the “Stop” button is pressed, or after the Quartz Tube is removed.) (See Figure 5.3.5).

5 Operating Instructions



If the Quartz Tube is removed before the conclusion of the specified test duration (pre-set measurements only), the measurement will be stopped but not invalid.

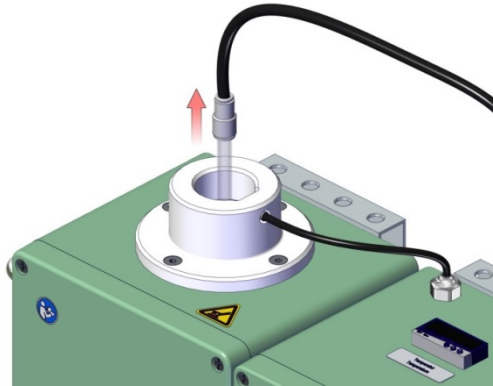


Figure 5.3.5

10. Hold the Quartz Tube with the supplied Sample Holder and pull the Measuring Tube (and Plug Coupling) free.
11. Place the hot Quartz Tube in the bracket tube holder at the left rear of the PGD-E until it is cool. (See Figure 5.3.6).

NOTICE

Always separate the Quartz Tube from the Plug Coupling immediately after the measurement is complete to prevent melting damage to the Plug Coupling.

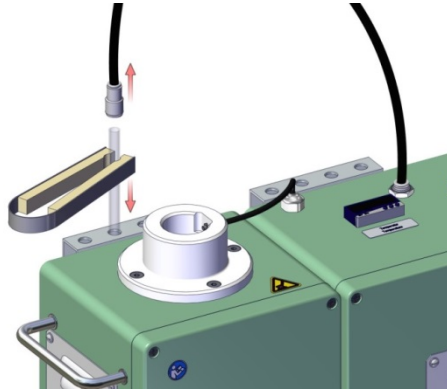


Figure 5.3.6

12. After the Measuring Tube has been removed from the Quartz Tube, the Measuring Tube will need to undergo a flushing process to remove residual gasses. Place the Plug Coupling end onto the Flushing Tube Connection (Item 4, Figure 7.2) on the right side of the Gas Pressure Measuring Device (see Figure 5.3.7).



Figure 5.3.7

13. Press the yellow button on top of the apparatus labeled, “Flush” (Item 9, Figure 7.4). This will draw air out of the Measuring Tube and will rid the tube of any residual gasses. It is recommended to carry out the flush for at least 60 seconds.

5 Operating Instructions

14. After 60 seconds has elapsed, press the “Flush” button again to stop the process. The Plug Coupling on the Measuring Tube should also cool down during this process.
15. Once the Quartz Tube has also cooled down, remove the sample from the tube and clean the Quartz Tube with the supplied Test Glass Brush. The sand sample should be disposed of in accordance to local regulations.

5.4 Measurement Evaluation

Double clicking anywhere on the display allows the curve display to change from a vertical axis range of 500 mb to a vertical axis range that fits the curve data (as shown in Figure 5.4.1).

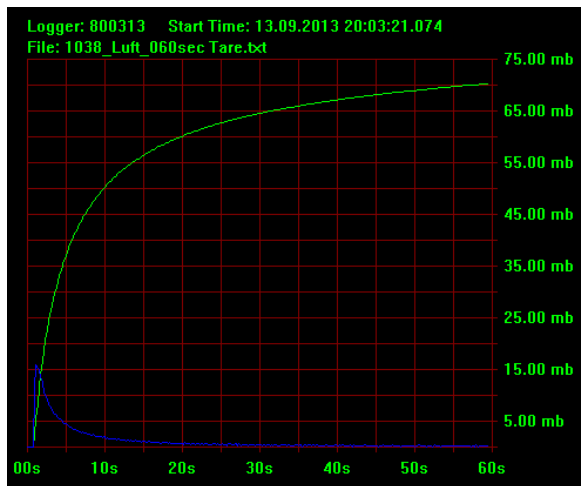


Figure 5.4.1

5.4.1 Measurement Storage

Once measurements have been made, they are stored in the computer's memory as a .txt file and may be viewed at any time through the ADS16DAN program (see Section 5.1.1 for Toolbar options). The software allows the operator to open and view up to five curves simultaneously.



An alternative to viewing curves in the supplied software program is to open the measurements into another spreadsheet program (i.e. Microsoft Excel). This allows for the customization of data display and analysis. There are two methods of obtaining the gas pressure data in an Excel file format:

- a. The data may be opened directly in the .txt file format. The user may then manually highlight, copy, and paste the data into an Excel workbook.
- b. With the Microsoft Excel program open, the user may select, "File," "Open," and select the .txt data file from the computer storage. A Text Import Wizard window will then appear. Choosing the "Delimited" option instead of "Fixed Width" in "Step 1" of the Text Import Wizard, will allow the data to be displayed properly in the Excel workbook. The other options in the Text Import Wizard are not essential to proper data display and may be altered as needed.

5 Operating Instructions

Once the gas pressure data is in Excel format, the user may select the pressure data (2nd column in units of mb) and plot vs. the time data (1st column in units of s). The same process may be done for the differential data (4th column in units of mb/s) vs. time data.

The software installation disk provided with the PGD-E equipment contains digital instructions and template Microsoft Excel files. These files may be used for additional data analysis.

5.4.2 Curve Start

If the operator placed the Quartz Tube in front of the light sensor before inserting the tube into the Heater, the beginning of the curve will be horizontal. This is preferred over an immediate start because the pressure rise can be more clearly seen away from the graph's edge.



The starting pressure should be between 6 and 13 millibar (if utilizing a standard measuring tube). A starting pressure of 9 millibar results from the Quartz Tube being pressed onto the Plug Coupling at the beginning of the test. It is recommended to eliminate this pressure by venting. Venting is done by pressing the "Flush" button for a short time when the Measuring Tube Plug Coupling is attached to the Quartz Tube. The curve will start at 0 mbar thereafter.

5.4.3 Curve End

The measurement curve commenced with the “Start” button (no measurement time selected) will have a slight drop off at the end. This is due to a time delay between the heater and measurements. The delay is intentionally designed to reduce unwanted initial shaking and reduce the possibility of triggering the test multiple times. Because of the delay, the measurement will continue for a second after the Quartz Tube is removed from the Heater, and will show a pressure drop on the graph. This final pressure drop may be discarded when evaluating results.

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 Gas Pressure Measuring Device, Model PGD-E, is a precise mechanical/electronic measurement device and needs appropriate care.



*Before performing any maintenance, remove the electrical power cord from the wall receptacle and allow the Heater to cool to ambient temperature. 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

- Remove sand deposits in the working area with a brush, and wipe the operating elements with a soft cloth.

6.2 Quarterly Maintenance

- Check the Plug Coupling for heat damage (this occurs when exposed to extended periods of heat). The Plug Coupling should be replaced when damaged.

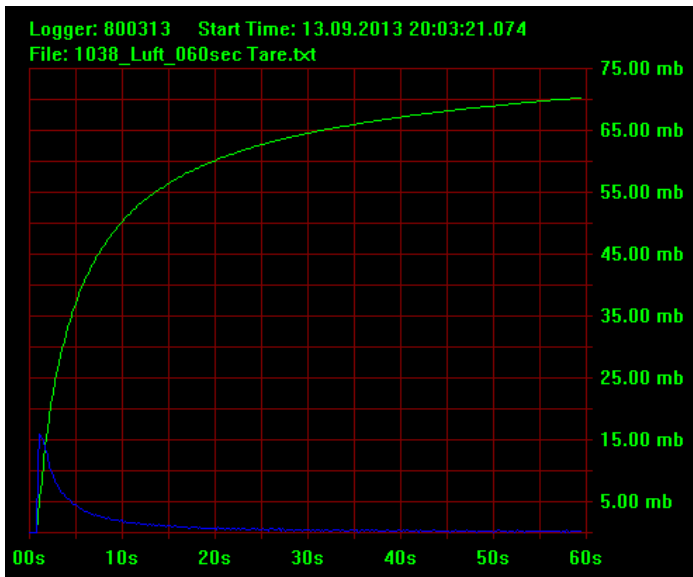
6.3 Calibration

The calibration of the Gas Pressure Measuring Device, Model PGD-E, is a “measurement of pressure without sand.” The calibration is simply a measurement of an empty glass tube at 850°C. No additional tools are necessary. The curve generated by the calibration test is compared with values from the calibration certificate. Test values that are consistent with those in the calibration certificate indicate a successful calibration.

1. Turn the Heater on to 850°C.
2. Flush the Connection Tube for 60 seconds (see Section 5.3, Step 12). This involves using the standard 800 mm tube and the room temperature Plug Coupling.
3. Choose the 60 second test on the ADS16DAN software and save the file when prompted (normal procedure).
4. Hook up the Connection Tube to the Glass Tube and press “Flush” once more for 2 seconds. This will remove any small preexisting pressure in the tube and allow the pressure measurement to start at zero.
5. Once the Heater has reached 850°C, place the connected Glass Tube at the top of the Heater entry for about 1 second (standard procedure) to allow the measurement to begin recording without incurring pressure yet.
6. After about 1 second, place the Glass Tube fully into the Heater and allow the remainder of the 60 second test to occur.

6 Maintenance and Calibration

- Compare the designated points of the generated measurement curve against the values in the calibration certificate. For example, after 20 seconds, the curve pressure should be 60 ± 5 mbar. The complete table of calibration values is displayed below in addition to an example of a calibration measurement curve (Figure 6.3.1). It can be seen that the graphical display coincides with the calibration values.



Time (sec.)	Pressure (mbar)	
0	0	± 3
10	50	± 5
20	60	± 5
40	67	± 5
60	70	± 5

Figure 6.3.1

7 Apparatus Layout

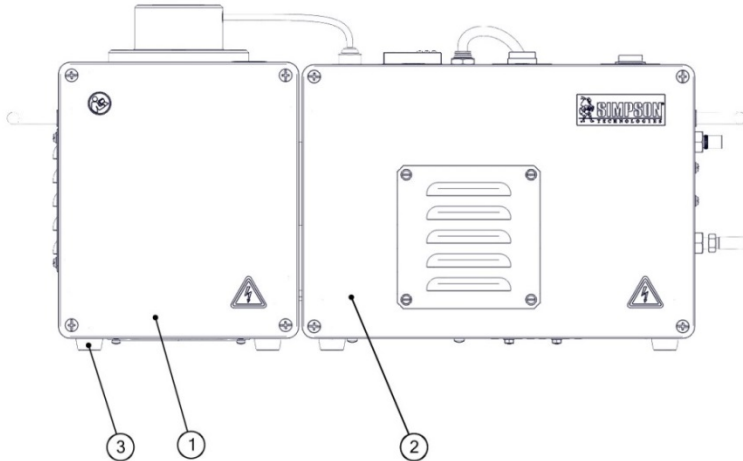


Figure 7.1: Front View

Item	Description
1	Heating Housing
2	Control Housing
3	Rubber Foot

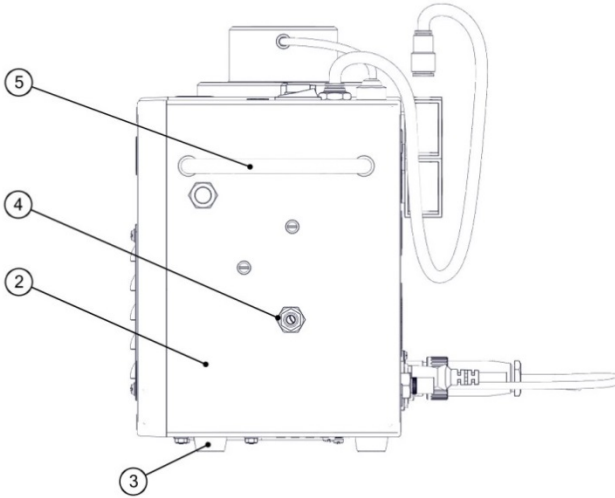


Figure 7.2 Right Side View

Item	Description
2	Control Housing
3	Rubber Foot
4	Flushing Tube Connection
5	Carrying Handle

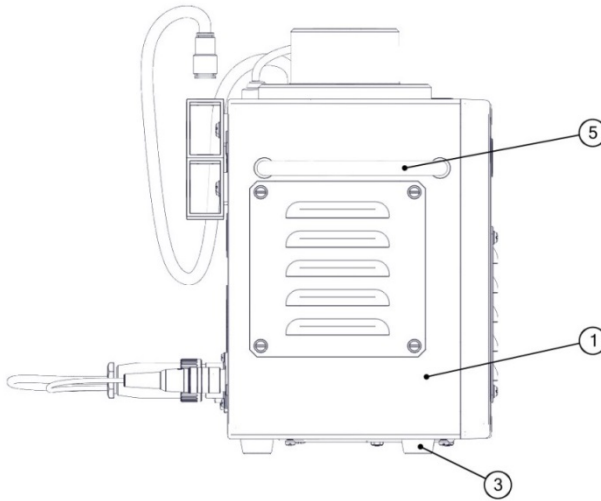


Figure 7.3: Left Side View

Item	Description
1	Heating Housing
3	Rubber Foot
5	Carrying Handle

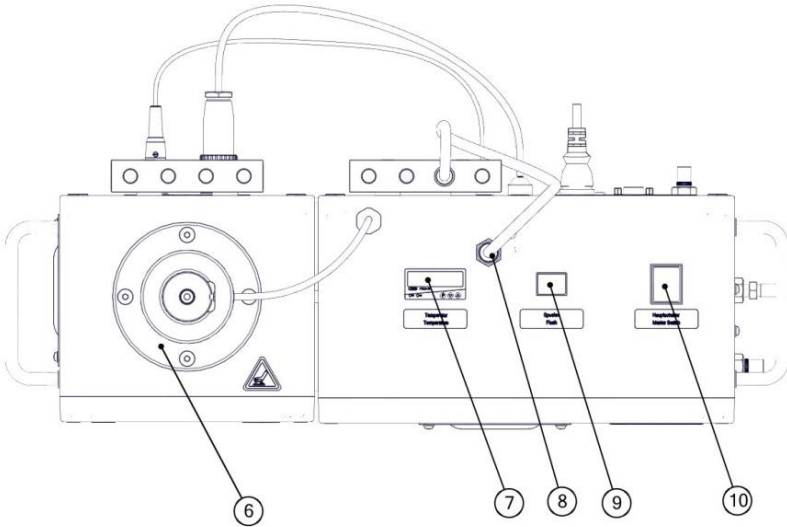


Figure 7.4: Top View

Item	Description
6	Heating Protection Collar
7	Temperature Control
8	Measuring Tube Connection
9	Flushing Button
10	Master Switch

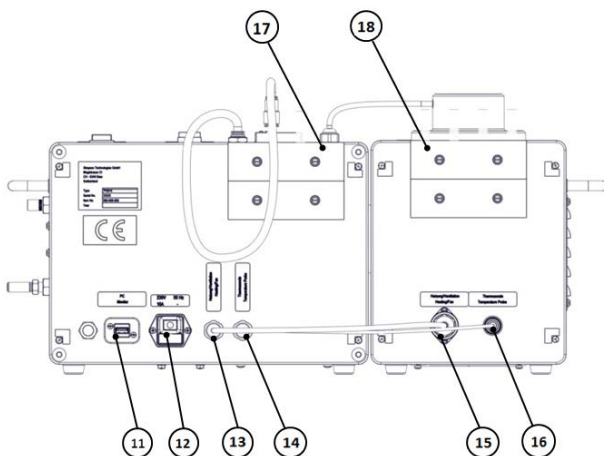


Figure 7.5: Rear View

Item	Description
11	PC Monitor Connection (USB Cable)
12	Power Cord Connection
13	Heating/Fan Power Output
14	Temperature Probe Power Output
15	Heating/Fan Power Input
16	Temperature Probe Power Input
17	Right Test Tube Holder (As Viewed from Front)
18	Left Test Tube Holder (As Viewed from Front)

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.

To see the corresponding part to the part number on the spare part list, see Figure 4.2.1.

Item	Part No.	Description
3	596-459-282	Straight Hose (Soft Nylon Hose)
4	596-459-280	Spiral Hose (Soft Nylon Hose)
5	596-459-268	Plug Coupling
6	592-806-853	Quartz Glass Tube
7	592-806-875	Glass Funnel
8	596-292-058	Test Glass Brush
9	592-806-867	Specimen Holder
10	592-806-866	Quartz Glass Tube Support
11	596-081-005	Power Supply Cable
12	596-081.209	Monitor Cable
14	596-299-014	Carrying Case 300x200x120

8.2 Ordering Replacement / Spare Parts

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 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 ensure 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.
- The return of existing products for factory repair or upgrade.
- 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, , 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 Gas Pressure Measuring Device and peripheral equipment.

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

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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