

Respiratory data analyser *SE-RDA*



User instructions



100507-03 B

Table of contents

Respiratory data analyser <i>SE-RDA</i>	1
User instructions.....	1
Table of contents.....	2
Description.....	2
Principle of operation.....	2
Unpacking.....	3
Components.....	4
Operation functions.....	6
Operation of the SE-RDA.....	10
Decontamination and cleaning.....	13
Packing and storage.....	14
Calibration.....	14
SE-RDA PC software.....	15
Using the SE-RDA software.....	21
Real-time graph mode.....	29

Description

The SE-RDA Respiratory Data Analyser is a portable instrument for recording and analysing real-time flow rate and mask pressure data for unassisted filtering respirators in real use situations in the workplace, for durations up to a full shift.

The SE-RDA may be used to provide information on the suitability of assisted filtering respirators in particular work environments, and to assess the adequacy of the positive pressure air delivery rate in those environments.

The SE-RDA unit is supplied with a detachable adapter designed for use with Sundström SR100 half-mask and SR200 full-face respirators.

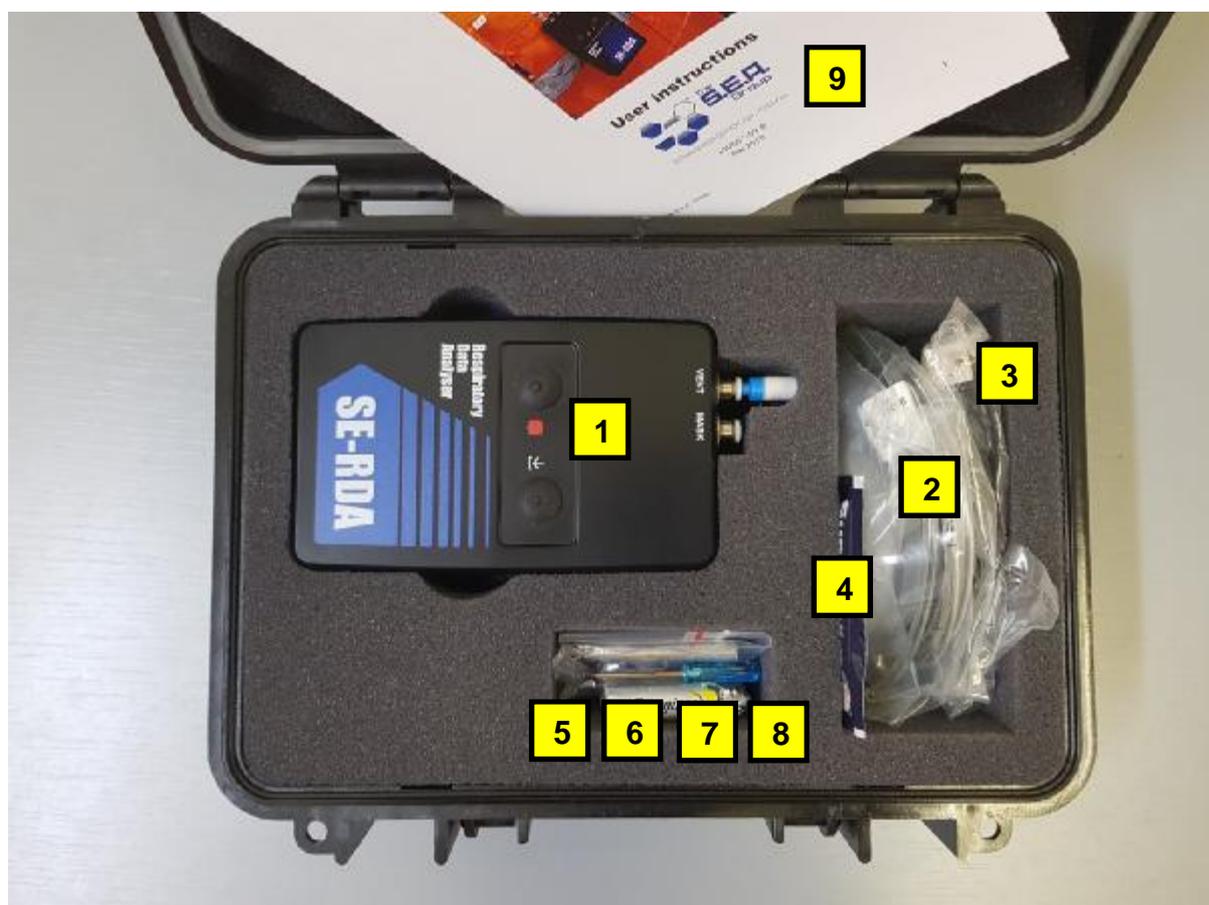
Principle of operation

The SE-RDA unit is connected to a respirator via the SR100/200 adapter fitted in place of one of the respirator's exhalation valves. The SE-RDA unit measures and records pressure in the breathing zone of the respirator via the pressure tube. Pressure data is then downloaded to a computer. Using the pressure-flow characteristics of the precalibrated filter and exhalation valve, the SE-RDA software converts pressure data to breathing data. The breathing data may then be analysed in various ways using the SE-RDA software.

Unpacking

The SE-RDA is supplied in its own carry case, which contains:

1. SE-RDA unit with a disposable vent port filter fitted
2. SR100/200 adapter with pressure tube
3. USB data cable
4. Sanitising face-wipe
5. Three AAA batteries (nonrechargeable)
6. USB flash drive containing installation files for SE-RDA PC software for use on Windows PCs
7. Spare vent port filter
8. Screwdriver for battery cover fastener
9. User instructions



Components

SE-RDA unit

The SE-RDA unit is a small, portable, battery-powered data logging device. It may be hand-held, pocket-mounted or belt-mounted. It is resistant to dust and water and is suitable for use in industrial environments. The unit will run for at least ten hours on fresh batteries.



1. RECORD button
2. FUNCTION button
3. VENT port
4. MASK port
5. LED indicator
6. Micro-B USB port
7. Sealed battery compartment lid
8. Pocket clip

Precalibrated filter set

Each precalibrated filter set (supplied separately) consists of a P3 particulate filter or a combination gas/particulate filter, including prefilter. The precalibrated filter sets are real filters approved for use with the Sundström SR100 and SR200 respirators.

The air flow resistance characteristic of each filter set has been accurately measured in the factory. The flow parameters *A_{neg}* and *B_{neg}* are marked on each filter set. The SE-RDA software uses these parameters to convert the recorded mask pressure data to *inhalation* flow.

Important

Each filter set may be used for a single shift only. The prefilter must always be fitted during use. Using the SE-RDA without the prefilter will invalidate the filter calibration and cause inaccurate flow rate measurement. Do not disassemble the filter sets, or replace a filter in the set. If the filters are tampered with or damaged, the filter parameters may no longer be valid.

SR100/200 adapter with pressure tube

The SE-RDA is supplied with an adapter which is suitable only for Sundström SR100 and SR200 respirators. The adapter connects the breathing zone of the respirator to the MASK port on the SE-RDA unit.

Each SR100/200 adapter is supplied precalibrated. It is marked with a serial number and two filter parameters, *A_{pos}* and *B_{pos}*. During *exhalation*, the SE-RDA logs the pressure drop across the exhalation valve. The parameters are used to convert the pressure drop to *exhalation* flow rate.

Important

Do not disassemble or tamper with the SR100/200 adapter. Doing so may invalidate the parameters, resulting in inaccurate flow rate results.

Note: The exhalation valve has lower air resistance and less predictable air/flow characteristic than the filters, therefore the accuracy of exhalation flow measurement will typically be lower than for inhalation, especially at lower breathing rates.

SR100 and SR200 respirators

Any Sundström SR100 half-mask or SR200 full-face respirator may be used with the SE-RDA, provided it is properly maintained, in good working order and used in accordance with the user instructions.

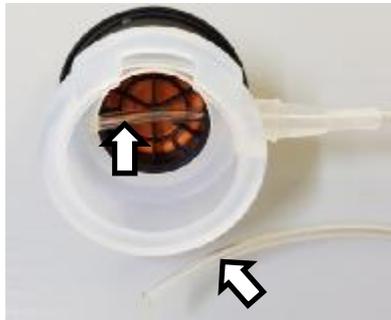
Warning

The SR100/200 adapter's pressure tube must be connected to the SE-RDA MASK port AT ALL TIMES during use of the respirator. If the pressure tube is open to the air it will provide a direct leakage path from the environment into the breathing zone, resulting in reduced or no breathing protection.

Operation functions

Preparation for use

1. Fit or replace the batteries.
2. Check that the vent port filter is fitted to the VENT port of the SE-RDA unit, and that it is clean and dry. Fit or replace the vent port filter as necessary. If the unit has been decontaminated, the vent port filter must be replaced before use as it may have become clogged during decontamination. A clogged vent port filter will cause measurement errors.
3. Check that the transparent pressure tube is clear of kinks and obstructions. In particular, check for the presence of water inside the tube inside the adapter. Obstructions will cause measurement errors.



1. Ensure the wearer has been fit-tested for the type of respirator to be worn.
2. Ensure the respirator is clean and sanitised, and is fully functional.
3. Attach the SR100/200 adapter to the respirator.
4. Connect the pressure tube of the SR100/200 adapter to the SE-RDA unit.

The SE-RDA is ready for use.

Fit or replace the batteries

Before using the SE-RDA in a workplace test, new batteries should be fitted. High-quality batteries (e.g.: Duracell or Energizer) are recommended to ensure long duration.

1. Unscrew and remove the battery cover on the rear of the SE-RDA using the screwdriver supplied.
2. Wipe away any moisture or dust that may be present around the lip of the battery compartment and cover. Check that the cover gasket is in place and in good condition.
3. Remove the three batteries (if fitted).
4. Insert new AAA batteries, ensuring correct polarity as indicated inside the battery compartment.
5. Refit the battery cover and fasten the screw. Tighten screw firmly, taking care not to overtighten.

Note: Do not leave batteries in the SE-RDA unit for extended periods as they may leak and cause permanent damage to the unit.



Undoing battery cover screw



Removing battery cover



Replacing batteries

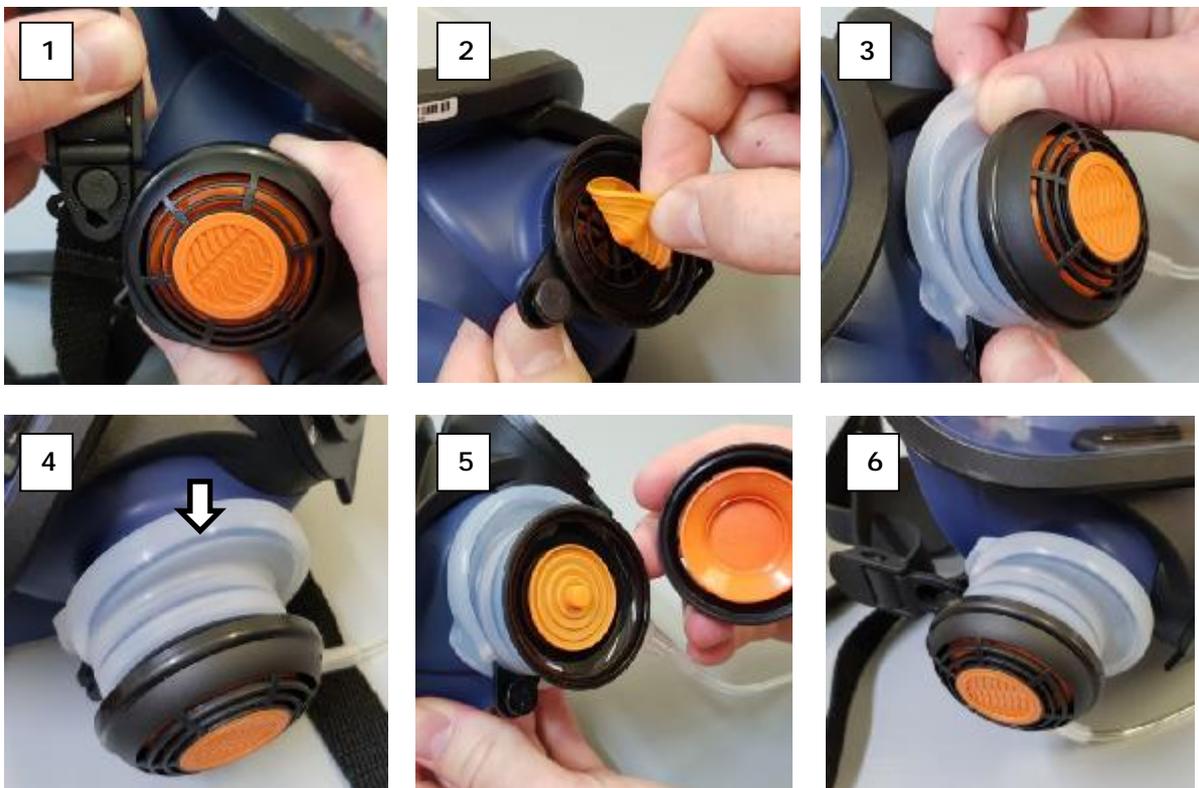
Attach or detach the SR100/200 adapter

To attach the SR100/200 adapter to the respirator

1. (SR200 only) Disconnect the head harness and neck strap from the right-side exhalation valve housing.
2. Remove the exhalation valve cover and exhalation valve disc from the respirator. Put them aside for refitting after the test.
3. Fit the silicone adapter over the exhalation valve housing.
4. Check that the adapter is properly seated all the way around – the rim of the housing should be visible through the silicone.
5. Remove the exhalation valve cover from the adapter and check that the exhalation valve disc is in place and properly seated. This is essential to ensure safe operation of the respirator while the SE-RDA is fitted. Refit the cover.
6. (SR200 only) Reattach the head harness and neck strap.
7. Connect the pressure tube to the MASK port on the SE-RDA unit.
8. Perform a respirator fit check as per the respirator user instructions.

Warning

Incorrect fitting of the SR100/200 adapter may result in reduced or no breathing protection!



To detach the SR100/200 adapter

1. Follow the reverse of the procedure described above.

Warning

It is essential to ensure the respirator's exhalation valve is refitted correctly. Failure to correctly fit the exhalation valve will result in reduced or no breathing protection!

Connect or disconnect the pressure tube or vent port filter

The pressure tube (MASK port) and vent port filter (VENT port) attach to the push-in connectors on the SE-RDA unit.

To connect:

1. Insert the tube or filter shank into the connector and push firmly until it stops.
2. Pull gently to check it is secure.

To disconnect:

1. Press down on the connector's locking collar and pull out the tube or filter.

Note: Before reinserting, check the condition of the end of the pressure tube or the shank of the filter. If there are signs of distortion or damage, cut the end of the tube off clean and square, or replace the filter.



Inserting pressure tube



Releasing pressure tube



Releasing vent filter

Operation of the SE-RDA

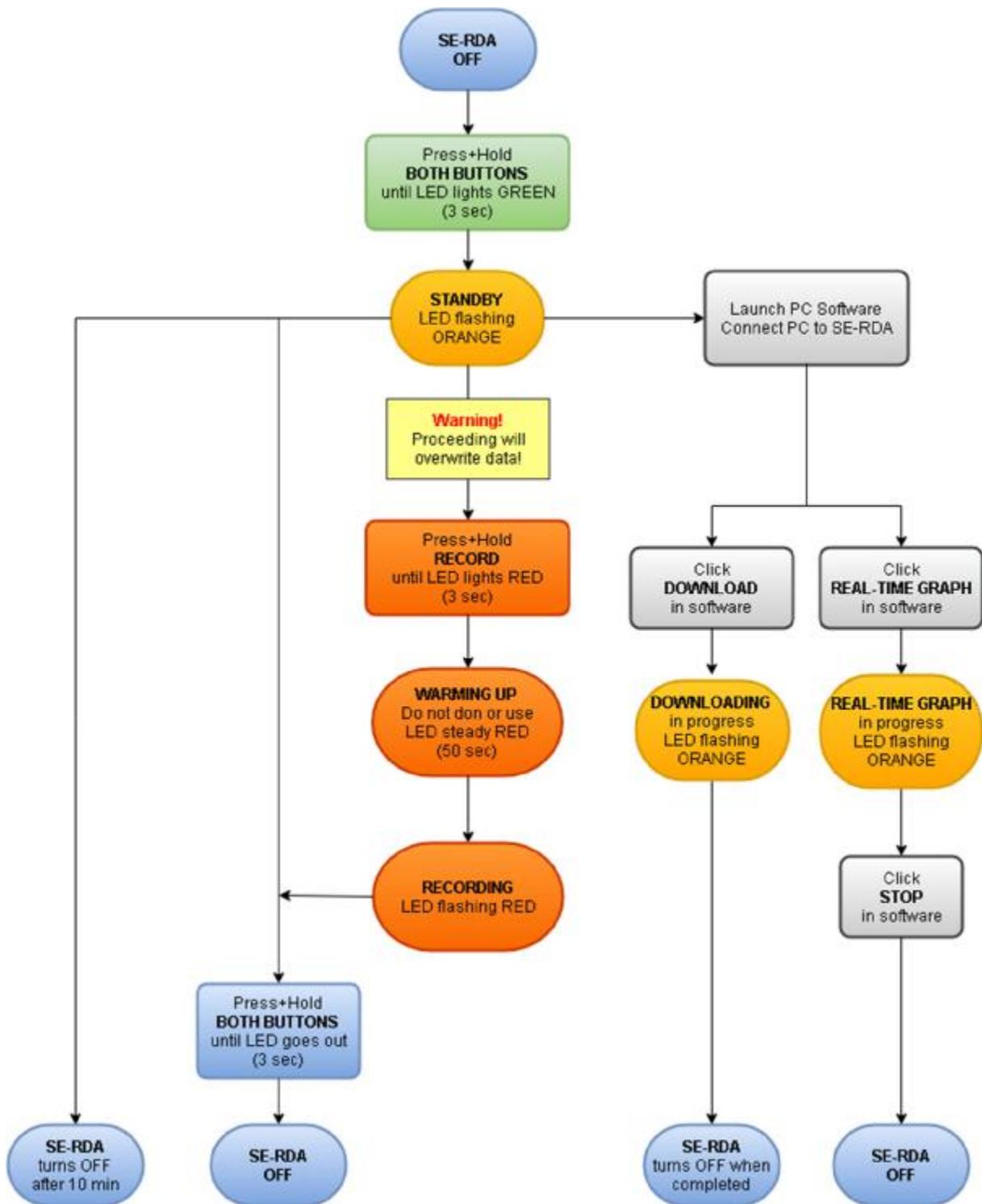
1. Set the SE-RDA to STANDBY.
2. Set the SE-RDA to RECORD. Wait until the steady RED LED changes to blinking RED (about 50 sec). Do not disturb the unit during this warm-up period.
3. Don the respirator and SE-RDA.
4. Perform the workplace tasks. The wearer should keep in mind:
 - a. Perform the tasks as per the normal routine.
 - b. Take care not to snag or kink the pressure tube. Periodically check the pressure tube.
 - c. Periodically check that the LED is blinking RED (recording).
 - d. Protect the unit from extreme environmental conditions (e.g.: hard knocks, extreme heat).
 - e. Leave the SE-RDA in RECORD mode even during breaks and when the respirator has been doffed temporarily.
5. When the workplace test is completed, doff the respirator.
6. Turn the SE-RDA OFF.

Important

If the SE-RDA is inadvertently turned off during a test, the recorded data must be downloaded to a PC before resuming the test. When recording is next started, all recorded data in the SE-RDA unit will be overwritten.

NOTE: *It is recommended, but not essential, to start recording before donning the respirator. This results in a steady, zero-pressure trace at the start of the logged data, which is useful later on when analysing the data. See section Vertical offset correction.*

SE-RDA operation sequence



Set the SE-RDA to STANDBY

With the SE-RDA OFF:

1. Press and hold RECORD and FUNCTION buttons simultaneously until the LED lights steady GREEN (about 3 seconds).
2. Release the buttons. The LED flashes orange.

The SE-RDA is now in STANDBY mode. It is NOT recording.

If recording has not been started within about 10 minutes of setting to STANDBY, the unit will turn itself OFF automatically. To restart, repeat the turn-on process.



Setting the SE-RDA to STANDBY

Set the SE-RDA to RECORD

With the SE-RDA in STANDBY mode:

1. Press and hold the RECORD button (for about 3 seconds) until the LED lights steady red. The SE-RDA is WARMING UP. The SE_RDA is recording but should not be donned or used during this time.
2. After about 50 seconds, the LED begins flashing RED. The SE-RDA is RECORDING and is ready for use.

The SE-RDA can record for at least ten hours with fresh batteries.

Note: Each time recording is started, all previously recorded data in the unit will be overwritten. Always ensure that any valuable data has been downloaded before starting recording.

Note: Do not turn off the SE-RDA at any time during the recording process, even while resting or when the respirator is not being worn. If the unit is inadvertently turned off during use, download the logged data before restarting recording to prevent it being overwritten.

Note: The recorded data remains stored in the unit even if the batteries are removed.

Don the respirator and SE-RDA

1. Hang the respirator around the neck using the neck strap (SR200) or head harness (SR100).
2. Attach the SE-RDA unit securely to the body, either:
 - a. in a shirt pocket, or
 - b. mounted on a waist belt using the SEA mounting bracket (model no. HSE)

3. Ensure that the vent port filter is open to the air and not covered by clothing.
4. Don the respirator as per the respirator user instructions.
5. Position the pressure tube close to the body to minimise snagging hazard. The tube may be tucked inside clothing. Ensure that the tube is free of kinks.



Mounting SE-RDA unit



Pocket mounted



Waist-belt mounted

Download the data

Downloading the data is described in the paragraph "To download data from the SE-RDA unit to the PC" on page 23 of this document.

Turn the SE-RDA OFF

Press and hold RECORD and FUNCTION buttons simultaneously. Hold buttons for about 3 seconds until the LED goes out. Release buttons. Make sure LED is out.

Decontamination and cleaning

After working in a contaminated environment, the SE-RDA unit, adapter and respirator may require decontamination to prevent contamination of clean areas and prevent contamination of and/or injury to the user and other personnel.

Decontamination procedures should be developed as part of the organisation's respirator program and should be appropriate to the hazards involved.

When decontaminating, consider the following:

- The SE-RDA is water-resistant. It is NOT waterproof. Never submerge the unit in water.
- Do not remove the respirator from the face nor disconnect the SR100/200 adapter from the unit during decontamination.
- After removing the respirator, do not allow direct water streams inside the facepiece. Water may enter the opening of the pressure tube and affect measurement accuracy.
- The vent port filter should always be replaced after decontamination in a shower.
- During decontamination, water may collect under the lip of the battery cover. When removing the battery cover after decontamination, take care to wipe away excess water and prevent it from entering the battery chamber.

- When cleaning the SE-RDA unit, wipe down with a damp cloth. Do not use solvents or abrasives.

Pressure tube and vent port

It is essential that the pressure tube remains free of obstructions, and that the vent port filter is clean and unblocked. Blockages or resistances in either will result in incorrect pressure measurement and flow rate calculations.

Moisture can sometimes enter the opening of the pressure tube inside the respirator due to build-up of exhaled moisture or as a result of cleaning. After use and cleaning, inspect the clear pressure tube for signs of moisture inside the tube.

If moisture is present:

1. First disconnect the pressure tube from the SE-RDA unit.
2. Using an aerosol air duster, blow dry air through the tube from the end furthest from the contamination, until it is cleared.
3. If the contamination cannot be cleared, the SR100/200 adapter must be replaced.

Important

NEVER use compressed air to clean MASK or VENT ports on the SE-RDA unit. Never use compressed air to clean the vent filter or pressure tube while still connected to the SE-RDA unit. Permanent damage to the internal pressure sensor may result.

Packing and storage

After cleaning, repack the components into the carry case. Before packing, ensure that all parts are dry.

When coiling up the pressure tube, take care not to cause sharp bends or kinks.

Remove the batteries from the unit prior to repacking if it may be unused for extended periods, as battery leakage may cause permanent damage to the unit.

It is recommended to store the SE-RDA in its carry case in a cool, dry place, away from direct sunlight and sources of vibration.

Calibration

The SE-RDA is supplied factory-calibrated.

To verify accurate operation of the SE-RDA, the user may perform a static pressure measurement test, by applying a static pressure to the mask port and comparing the measured pressure with a reference manometer. Take care not to apply more than 20 cm H₂O to the mask port as damage to the pressure sensor may result. For further information see section Real-time graph mode.

Measurement uncertainty

Pressure: ± 0.15 mbar, 95% confidence

SE-RDA PC software

The SE-RDA PC software, when installed on a Windows PC, allows the user to:

- download log files from the SE-RDA unit, view and save them
- open and view saved log files
- view charts of measured pressure for the whole log duration
- view pressure or flow rate for any selected data segment
- interpret a range of information from the logs, including:
 - o instantaneous flow rates
 - o minute volumes for a selected segment
 - o air volumes that occurred within selectable flow rate limits
 - o work of breathing
- save data logs as Comma Separated Value (csv) files

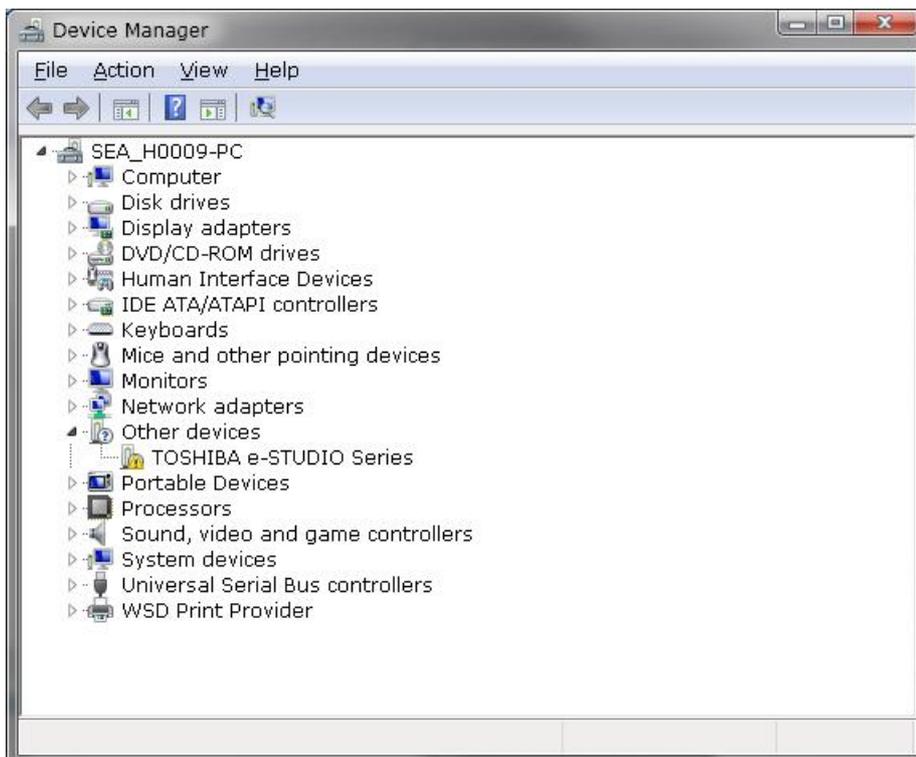
Installation of the software consists of:

1. Installing the USB driver
2. Installing the software
3. Obtain the port number from the driver

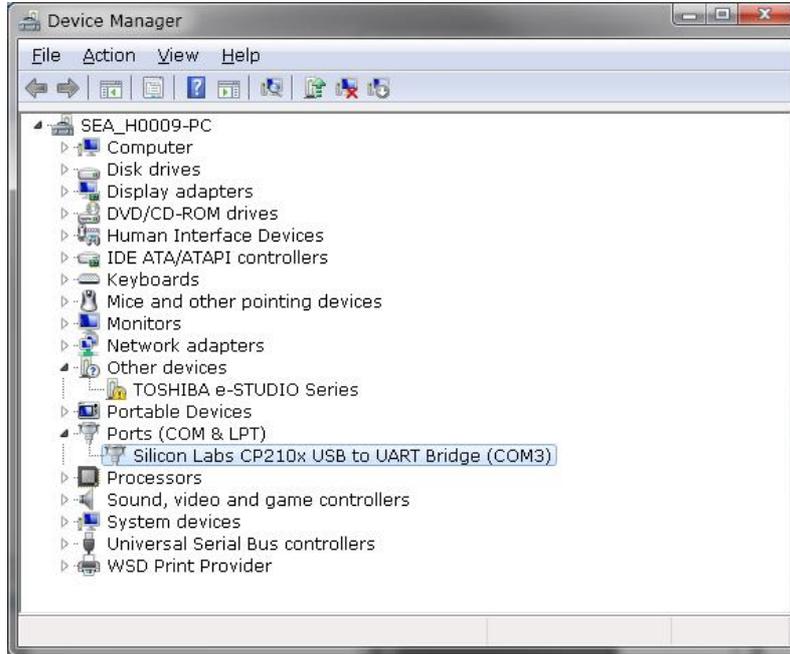
To install the USB driver

The USB driver creates a virtual COM (serial) port using a USB port on the computer.

1. Open Windows Device Manager. The easiest way is to click the Windows Start button, type "device manager" in the search field and press Enter.

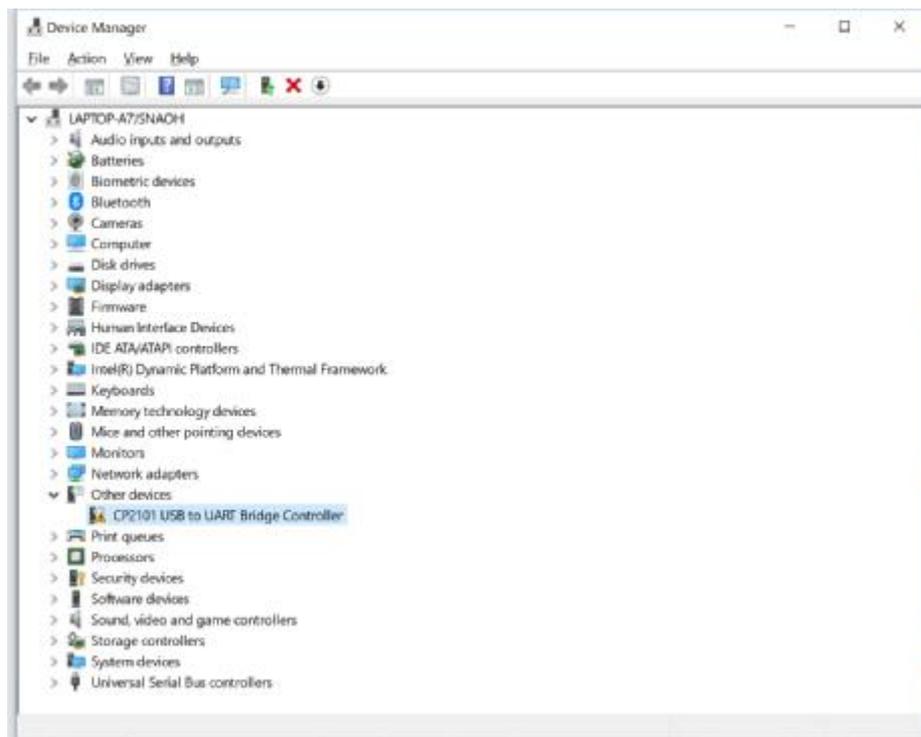


2. With the supplied USB cable, connect a USB port on the PC to the USB port on the SE-RDA unit.
 - a. If "Ports" now appears in the list, click to open it. In the example below, a USB to UART bridge port exists, and is configured as port "COM3".

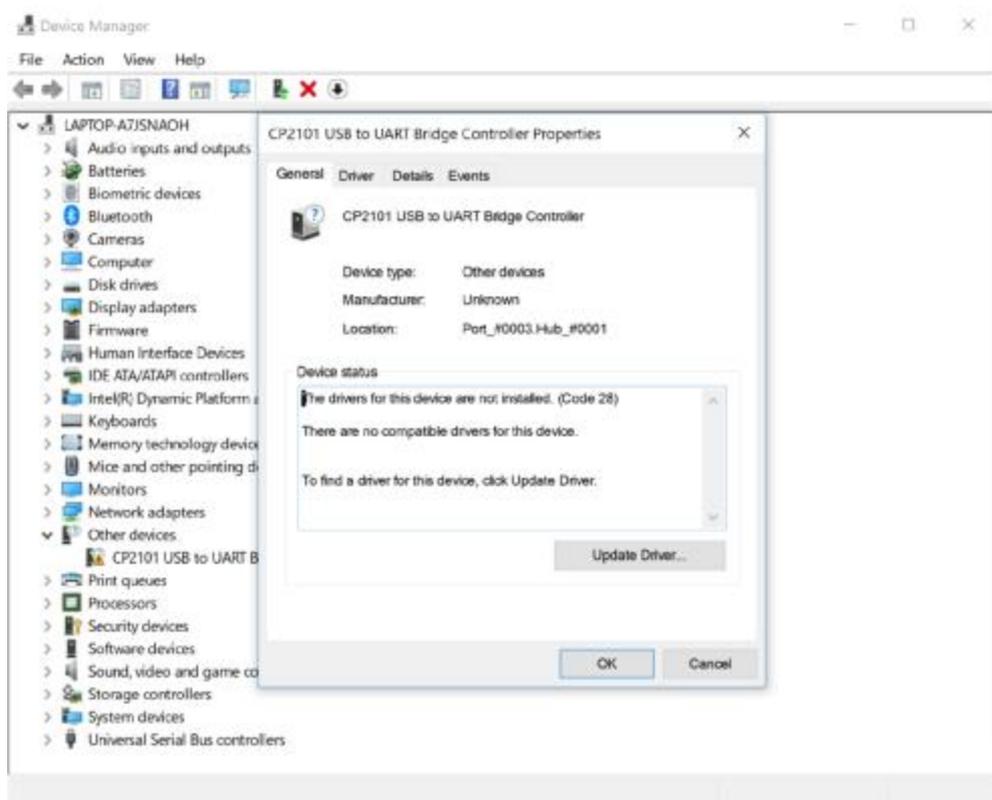


The PC recognises the SE-RDA unit and is ready to communicate with it. Go to the next step: "To install the SE-RDA software (Windows PC only)" in page 19.

- b. If "Ports" item does not appear, the USB to UART bridge controller should appear elsewhere (In the example below it appears under "Other Devices") as shown on the picture below. Please note the exclamation mark at the beginning of the line.



- c. Right click on it and select Properties. In the example below, it confirms that the driver is not installed.



- d. Follow the steps below to install the USB driver. The installation executable files for the USB driver are provided on the USB flash drive supplied with the SE-RDA.

To install the USB driver:

- i. First, ensure that the currently logged in user has Administrator privileges (necessary for Windows 10).
- ii. Connect the USB flash drive to a USB port on the PC.
- iii. Open the root folder on the USB flash drive.
- iv. Double-click on the file:

CP210xVCPInstaller_x64.exe (64 bit computers)

or

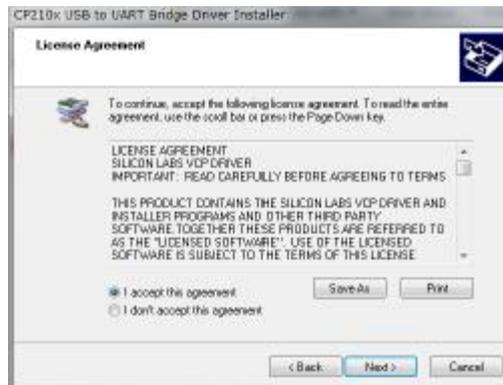
CP210xVCPInstaller_x86.exe (32 bit computers)

Note: Drivers are updated from time to time. If the installation process below is unsuccessful, it may be that the driver provided is obsolete. In this case it is recommended to download an up-to-date driver from www.silabs.com

- v. Accept any operating system permissions that are required to run the software. The installer window will appear:



- vi. Click "Next."



- vii. Accept the licence agreement and click "Next." The driver will install:



- viii. Click "Finish."



- ix. With the supplied USB cable connect a USB port on the computer to the USB port on the SE-RDA unit.
- x. Open the Device Manager and check that the COM port is present, as described in steps 1 and 2 above.
- xi. Take note of the COM port number. In this example it is COM3.

To install the SE-RDA software (Windows PC only)

The installation files are provided on the USB flash drive supplied with the SE-RDA.

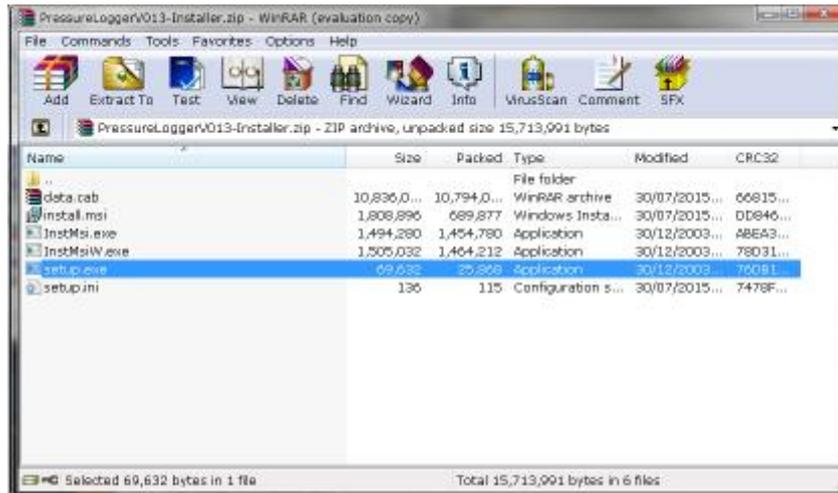
1. Open the root folder on the USB flash drive.
2. For a new installation double-click on the file:

PressureLoggerVxxx-Installer.zip

Alternatively, to upgrade an existing installation to a new version double-click on:

PressureLoggerVxxx-InstallerNoRuntime.zip

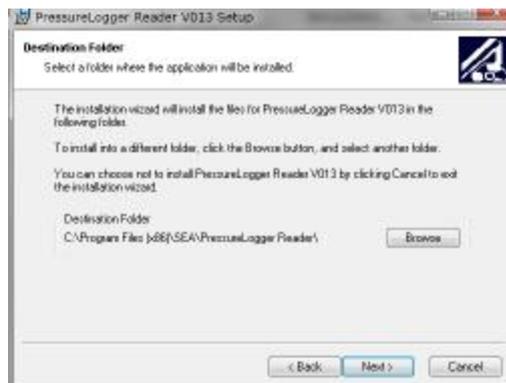
Note: In place of “xxx” will be the current version number of the file.



3. Double-click on the file setup.exe. If setup does not initiate, extract the zipped files to a storage location and run setup.exe from there. The installer window will appear:



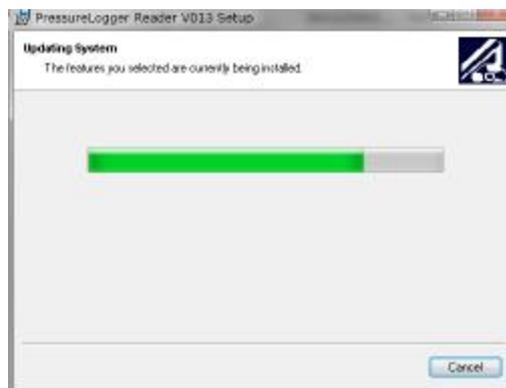
4. Click “Next.” The Destination Folder dialog will appear:



5. Select a new location or click "Next" to accept the default location. The Ready to Install dialog will appear:



6. Click "Next." The installation will commence:

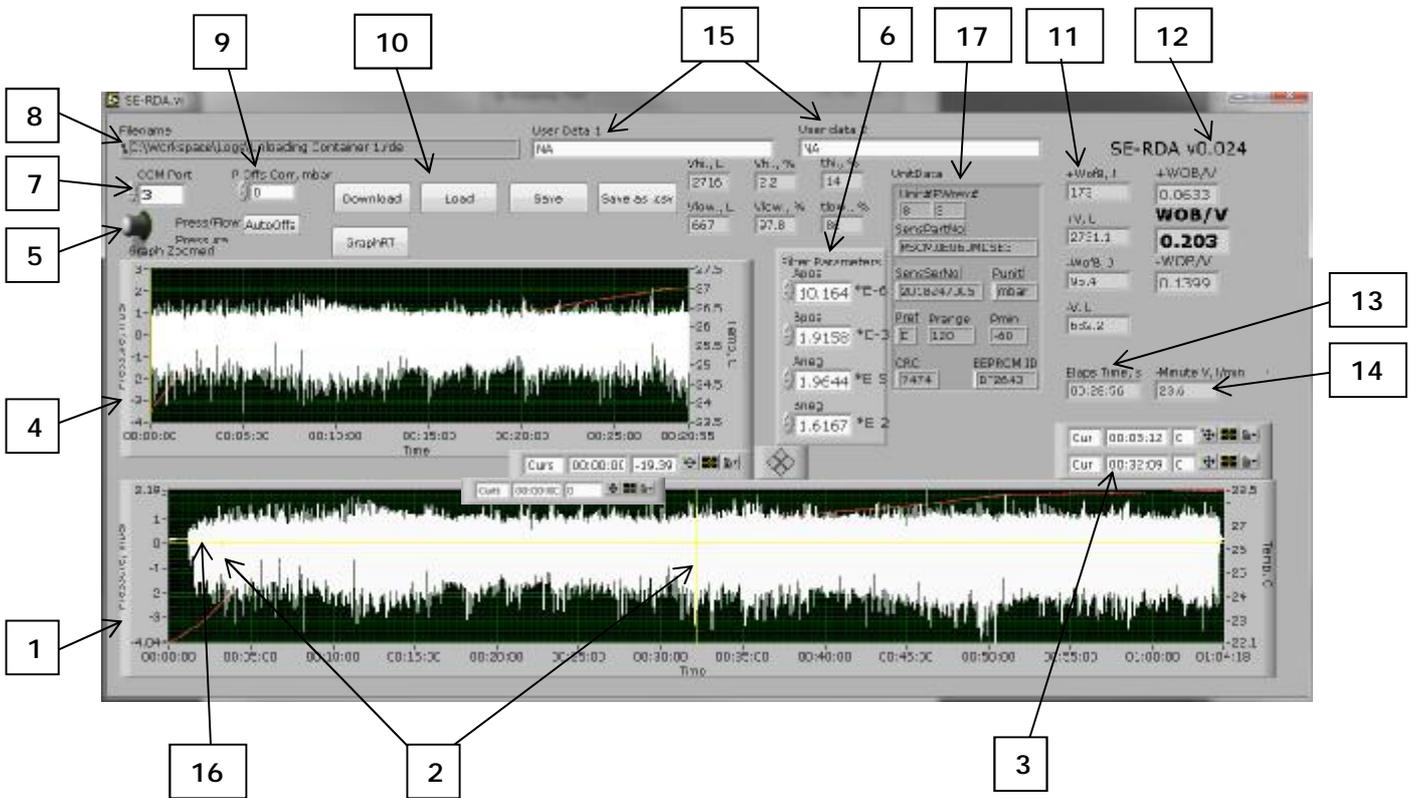


7. When the installation is complete, click "Finish."

Using the SE-RDA software

Features of the SE-RDA software main window

The figure shows the SE-RDA software main window. The various functions are identified and described below.



1. **Main graph area** – displays the entire pressure log. Displays Pressure (cm H₂O) vs Time (hh:mm:ss). In this example the total duration is 1h 04m 18s.

Note: The negative (inhalation) side of the graph has larger magnitude than the positive (exhalation) side because the inhalation resistance is higher than the exhalation resistance.

2. **Selection cursors** – click and drag the cursors to select a time range for detailed analysis.

3. **Cursor timestamps** – show the exact cursor positions (hh:mm:ss). You can enter times here to accurately position the cursors.

4. **Detail graph area** – displays the data range as selected between the cursors (2) in the main graph area (1). Displays Pressure (cm H₂O) vs Time (hh:mm:ss), or Flow (l/min) vs Time, as selected with the Press/Flow toggle switch (5).

5. **Press/Flow toggle switch** – Toggles the detail graph area (4) between Pressure and Flow. When Flow is selected, the filter parameters (6) are applied to calculate the Flow from the Pressure.

Note: The toggle switch can be used to refresh the displayed data after settings have been changed.

6. **Filter parameters** – parameters as marked on the filters and SR100/200 adapter that were used in the test. These values must be entered here manually, and are saved with the data file.
7. **COM port** – enter the COM port number to allow USB connection to the SE-RDA unit. The port number was obtained during driver installation (paragraph “a” on page 16)
8. **File name** – file name and location of current data file.
9. **Pressure offset correction** – enter value (mbar) to apply an offset to the Pressure trace in the detail window (4). This function is used to correct for pressure drift in the logged data which would otherwise affect the accuracy of the derived data.
10. **File management controls:**
 - a. **Download** – Download data file from SE-RDA unit to PC
 - b. **Load** – Open a saved data file
 - c. **Save** – Save the current data file
 - d. **Save as .csv** – Save selected data range as .csv (Comma Separated Value) file
11. **Volumes and work of breathing** – the software calculates various data from the selected data range in the detail graph area (4):
 - a. **+WofB, J** – Work of breathing (Joules) for positive flow (exhalation) for the selected range
 - b. **+V, L** – Total exhaled volume (litres) for the selected range
 - c. **-WofB, J** – Work of breathing (Joules) for negative flow (inhalation) for the selected range
 - d. **-V, L** – Total inhaled volume (litres) for the selected range
 - e. **+WOB/V** – Volume-averaged pressure (kPa) for positive flow (exhalation) for the selected range
 - f. **-WOB/V** – Volume-averaged pressure (kPa) for negative flow (inhalation) for the selected range
 - g. **WOB/V** – Total volume-averaged pressure (kPa) (sum of exhalation and inhalation) for the selected range

Note: The WoB/V values are equivalent to volume-averaged pressure as defined in standard ISO 16900-12:2016.

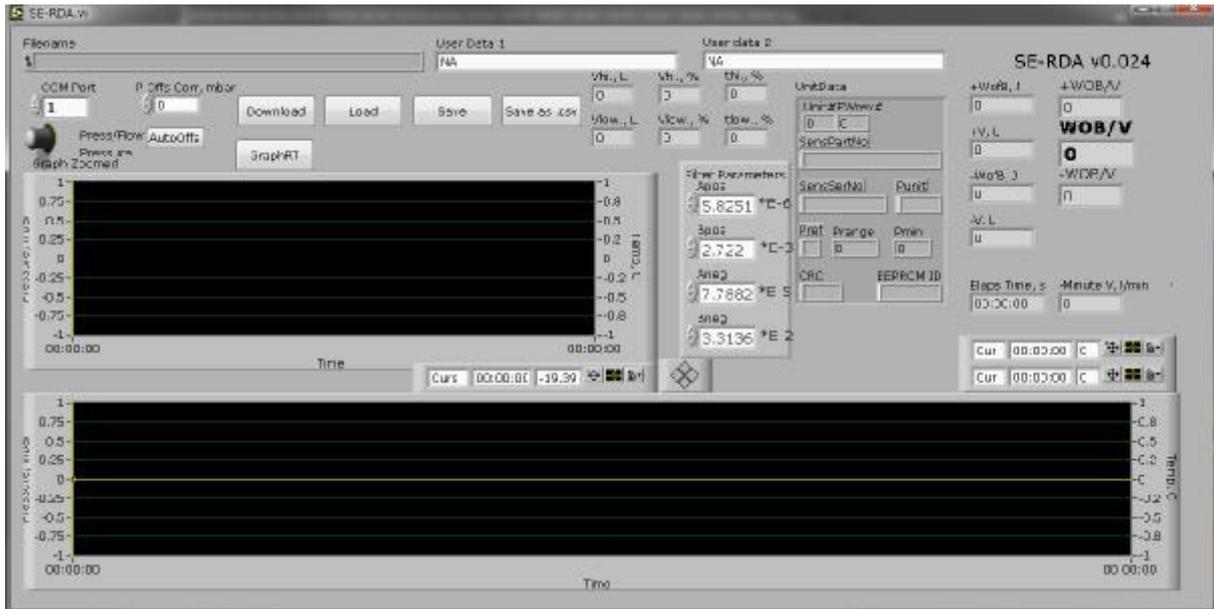
Note: Often there is a discrepancy between the exhaled and inhaled volumes; this is due to the lower accuracy of the measurement of exhalation flow rate. In case of discrepancy the inhalation flow rate should be given precedence.
12. **SE-RDA software current version**
13. **Elaps time, s** – the time interval (seconds) of the selected segment shown in the detail graph area (4).
14. **-Minute V (l/min)** – the inhaled minute volume (l/min) averaged over the selected data range shown in the detail graph area (4).
15. **User data** – Two user-editable fields for entering information about the data file.

16. **Adjustable threshold cursor and derived data** – The horizontal yellow line on the detail graph area (4) is an adjustable threshold cursor. Specific volume data can be derived from this. This feature is described in section Adjustable threshold cursor.

17. **Unit data** – serial number, firmware revision and other data about the SE-RDA unit from which the data was downloaded.

To launch the SE-RDA software

To launch the SE-RDA software select Start > Programs > SE-RDA Analysis Software, or double-click the SE-RDA desktop icon. The SE-RDA software main window will appear:



SE-RDA software main window

To connect the SE-RDA unit to the PC

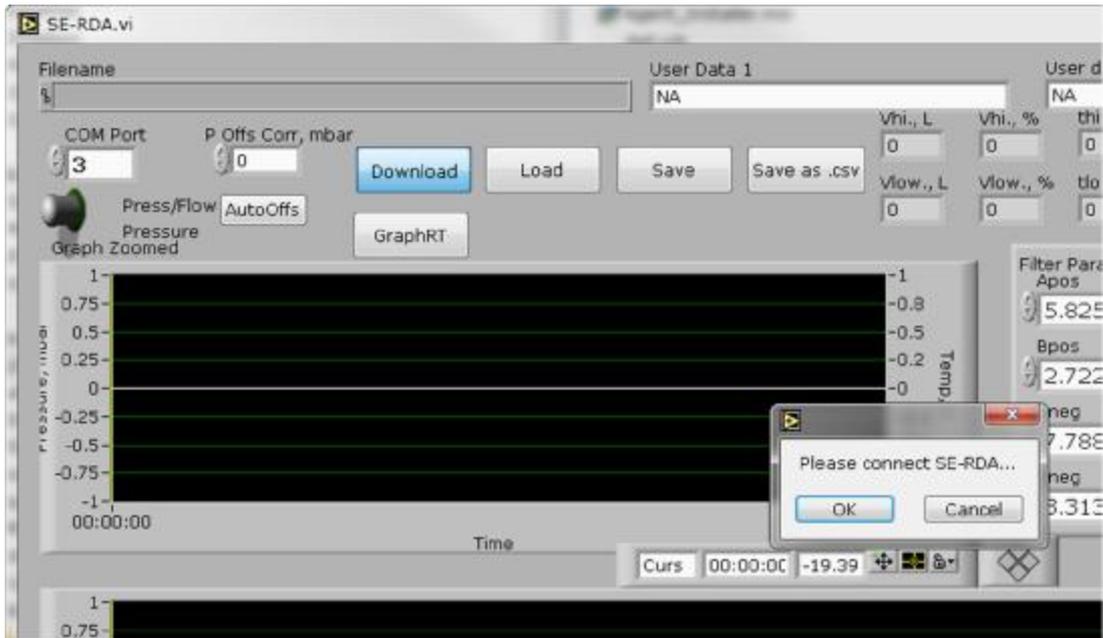
1. Connect the SE-RDA unit to the PC using the supplied USB cable.
2. Enter the correct COM port number, which was recorded earlier, driver installation (paragraph "a" on page 16) in the "COM port" field ("3" in this example).



To download data from the SE-RDA unit to the PC

With the SE-RDA unit connected to the PC, the software running and the com port number set:

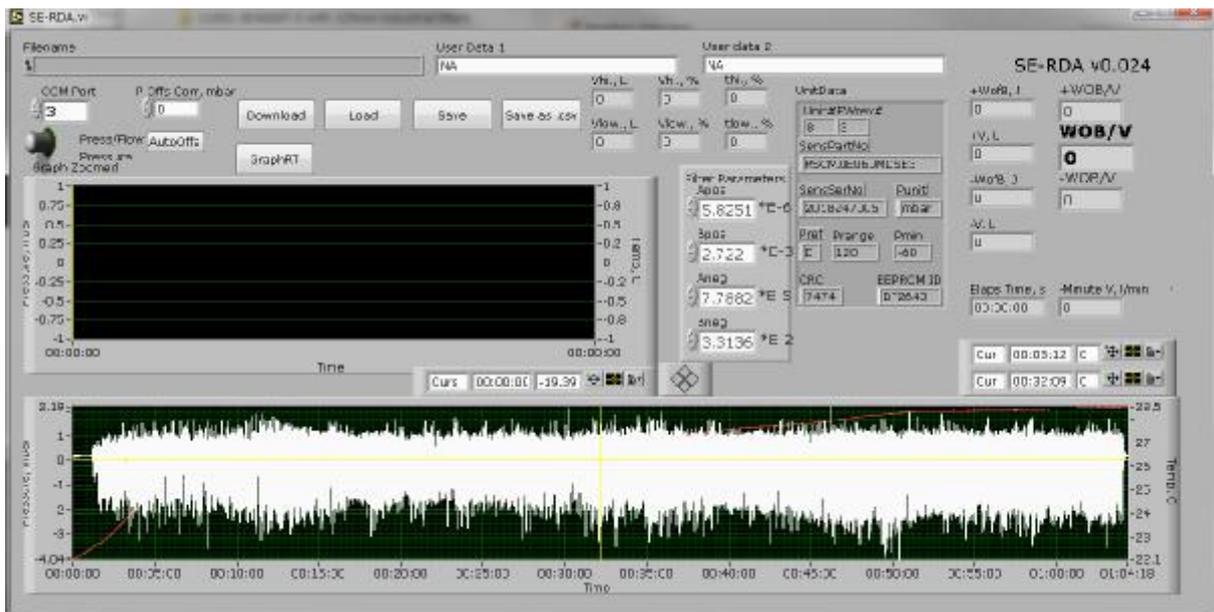
1. Set the SE-RDA to STANDBY.
2. Click DOWNLOAD button on software. A popup "Please connect SE-RDA..." will appear:



3. Click OK. Downloading will commence and a progress indicator dialog will appear:



Downloading may take up to 5 minutes, depending on the amount of data. When downloading is complete the SE-RDA unit will switch itself OFF automatically. The data is now loaded in the SE-RDA software and appears in the main window, but it is *not yet saved to disk*.

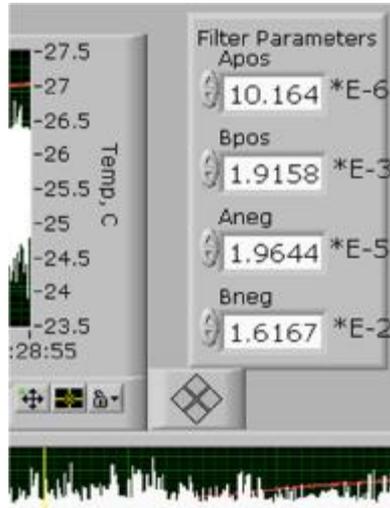


4. Enter the filter parameters that are marked on the filters and facepiece that were used to generate the data that has been downloaded. "Apos" and "Bpos" are for

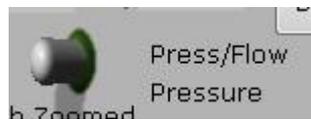
the exhalation valves (positive pressure); "Aneg" and "Bneg" are for the filter (negative pressure). Overwrite the default values that appear there.

Important

If the correct parameters are not entered, the software will generate incorrect flow data.



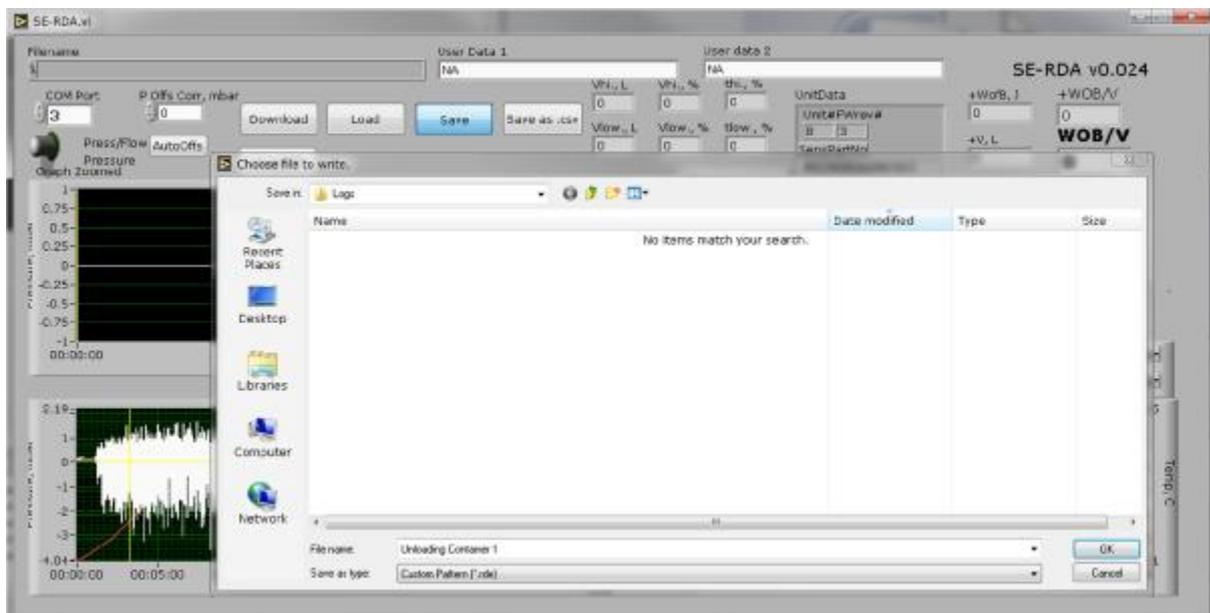
5. To apply the new parameters to the displayed data, refresh the display windows by toggling the "Press/Flow" switch back and forward.



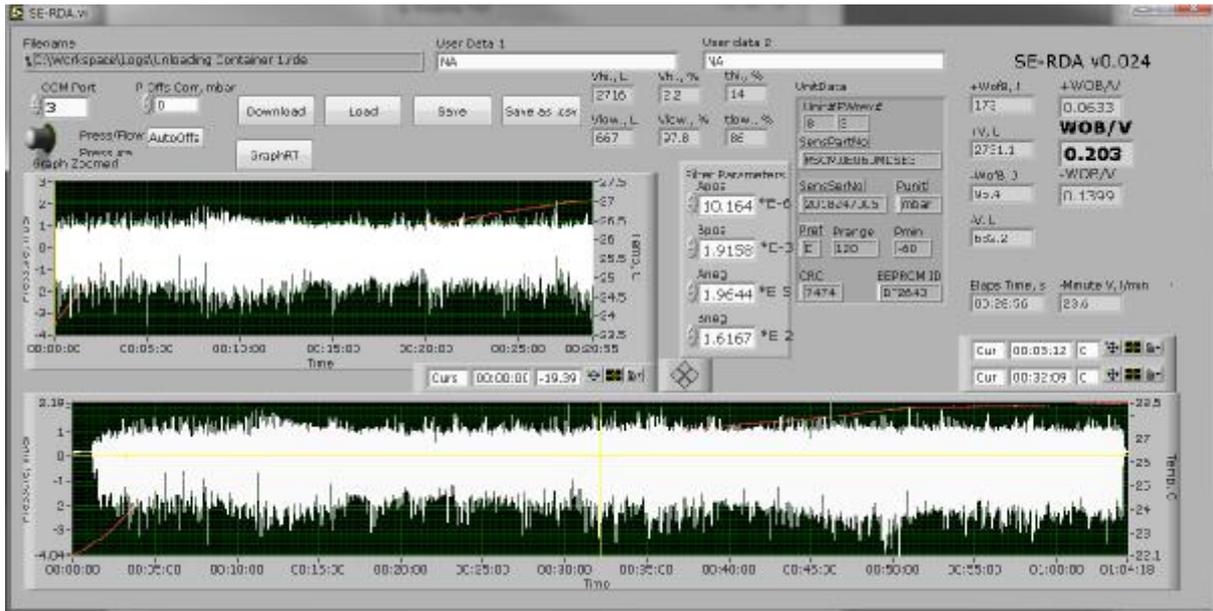
To save a data file

To save a data file to the PC:

1. Click SAVE in the main window, which opens a "save" dialog. Select a file location, enter a file name and click "save".



When saved, the file name and location appears in the Filename field (top left):



Save as a .csv file

When saving to .csv (Comma Separated Value) file, the logged pressure and flow rate data points are saved, only for the data segment selected between the cursors in the main window. The sampling rate is 50 samples per second.

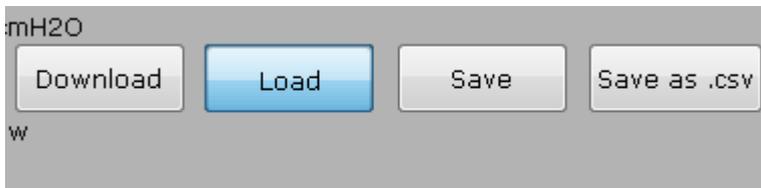
To save to a .csv file:

1. Select the desired data segment by dragging the cursors in the main graph window.
2. Click "SAVE AS .CSV" in the main window.
3. Select a file location, enter a file name and click "save".

Note: The larger the selected data segment, the larger the file size.

To open a saved data file in the SE-RDA software

1. Click LOAD (or click File > Open):



2. A "file open" dialog will appear. Browse and select the desired file, and click "open." The file data will appear in the main window.

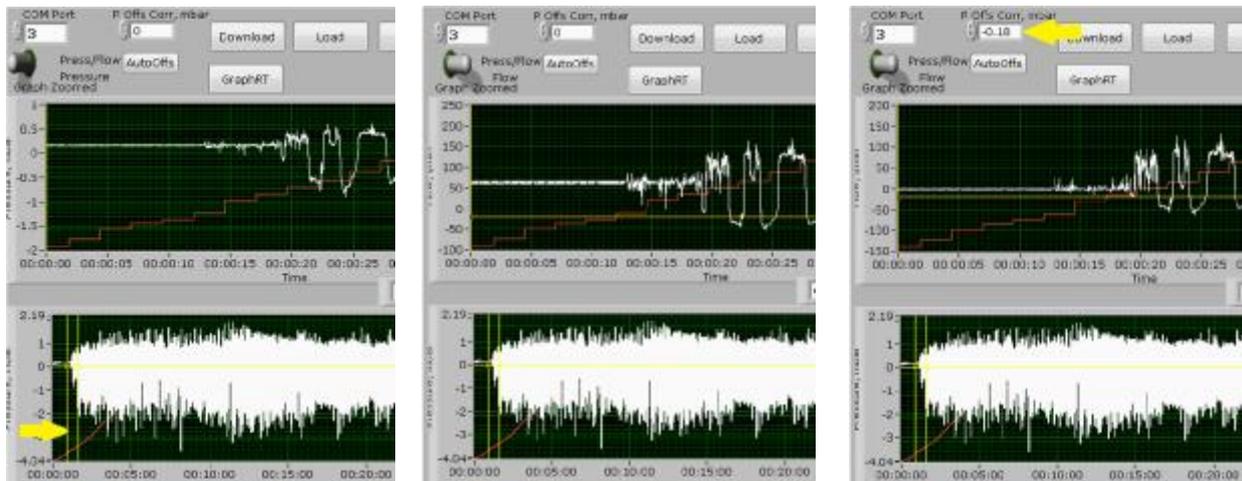
Vertical offset correction

Before using and interpreting the data, the vertical (pressure or flow) offset must be checked and, if necessary, corrected. This is ESSENTIAL because any offset will result in significant errors in flow rates and volumes. Offset is usually caused by drift in the pressure sensor.

Offset correction may be applied either automatically, using the “AutoOffs” button, or manually.

To check if offset correction is required

1. Move the selection cursors to select a range just before the onset of breathing (yellow arrow, Figure A). The selection is displayed in the detail graph area (after refreshing by toggling the Press/Flow switch). The selected period is at the end of the “warm-up” period (indicated on the SE-RDA unit by a steady red LED).
2. In the example, the steady trace at the left of the graph area sits slightly above zero pressure. Toggle the Press/Flow switch to Flow (Figure B). The offset is now much more marked: in the example, the trace sits at about +60 l/min.
3. If there is a visible offset, correction is necessary.



A. Pressure

B. Flow

C. Flow corrected

Sequence showing vertical offset correction process

Automatic offset correction

1. Select the Press/Flow toggle to Flow.
2. Check that the 40 – 50 second period on the plot is a steady horizontal trace (it should be if the unit was undisturbed during the warming up period).
3. Click the “AutoOffs” button. An offset value will appear in the field “P Offs Corr, mbar” above the button, and the horizontal trace should now be aligned with zero flow. If this is not the case, the offset may be corrected manually.

Manual offset correction

The process is the same as automatic offset correction except that, instead of clicking the “AutoOffs” button:

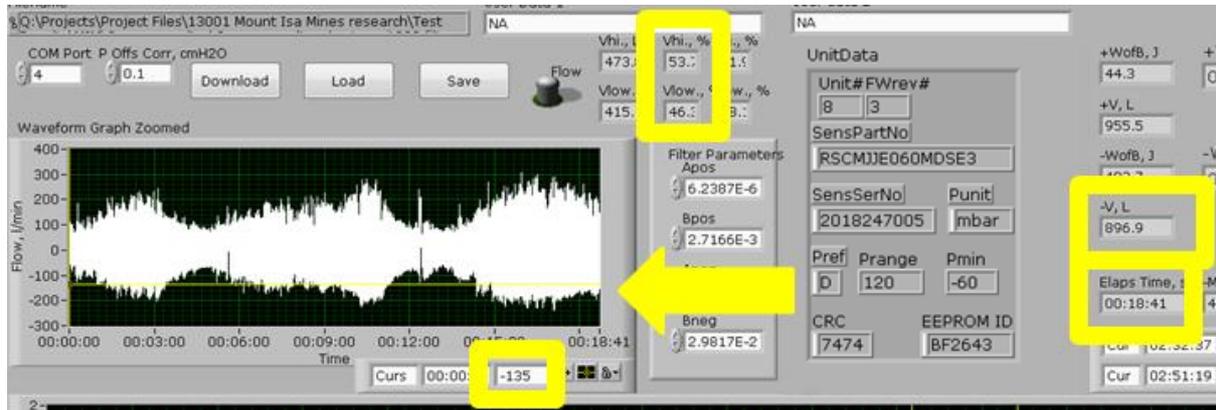
1. Manually enter a value in the “P Offs Corr, mbar” field.

2. Edit the value by trial and error until the trace is as close to zero as possible (each time toggling Press/Flow to refresh the display).

After completing the offset correction process, save the file.

Adjustable threshold cursor

The horizontal yellow line on the detail graph area can be moved vertically, either by dragging and dropping it or by entering a flow value in the field below it (16).

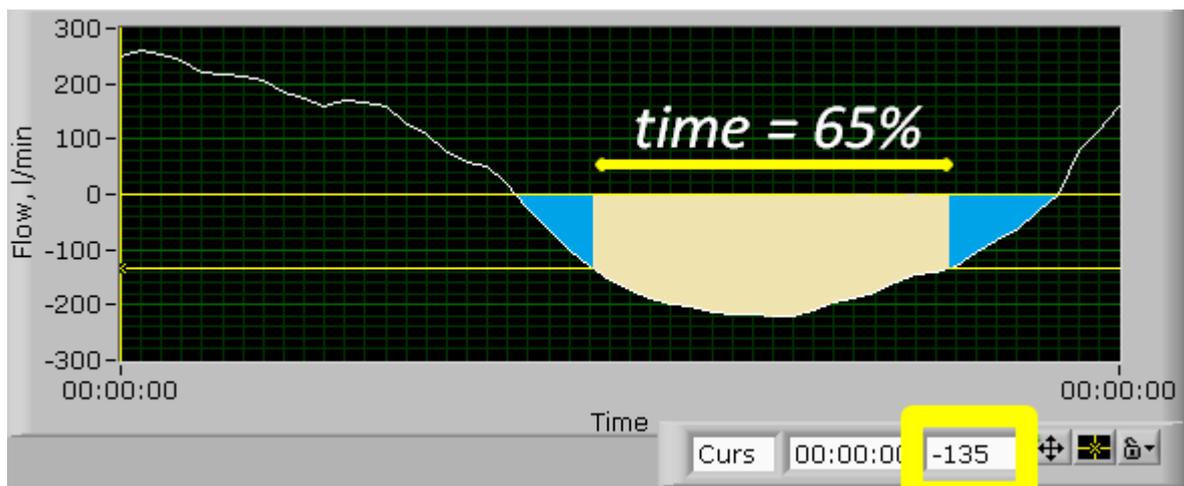


In the example above the threshold is set at -135 l/min. The selected data range is 18m 41s. The total inhaled volume (-V, L) is 896.9 litres, and the minute volume is 48 l/min.

Vlow % indicates 46%. This means that the air volume *below the threshold line* is 46% of the *total inhaled volume*. In other words, 46% of the total inhaled volume passed through the filter at a flow rate of 135 l/min or greater.

Vhi % indicates the remainder of the inhaled volume – i.e.: $(100 - Vlow)\%$.

The figure below illustrates how the volumes are calculated. In this example the selected range is a single breath. The minute volume for this breath is 78.2 litres; PIFR is 220 l/min.



The volume of air that passed through the filter at a flow rate of 135 l/min or greater (representing 65% of the duration of the inhalation phase) is indicated by the yellow area. It represented 81% of the total volume of the breath.

Note: This feature is designed to be used on the inhalation side of the curve only. If the threshold is set to the positive (exhalation) side the Vhi and Vlow data become meaningless.

Real-time graph mode

This function is not required for normal testing operations

The SE-RDA has a real-time graph mode in which the data is not logged but is output as a stream of real-time data. This allows pressure in the breathing zone to be monitored in real time with the software.

With the SE-RDA unit connected to the PC, the software running and the com port number set:

1. Enter parameters *Apos*, *Bpos*, *Aneg* and *Bneg*.
2. Set the SE-RDA to STANDBY.
3. Click GraphRT button in the software. A continuous stream of pressure data will commence.

To stop the data stream, click STOP in the software.



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