Air Leakage Finder 150

"...A lightweight, compact unit suitable for all duct leakage testing needs.."

Instruction Manual

WARNING: When in Negative Test Mode ALF150 is capable of generating 2500 Pa of Pressure. Please take care when testing Negative duct work.

Sensing Precision Limited. Units 15-16, C.R. Bates Industrial Estate, Wycombe Road, Stokenchurch, Bucks, HP14 3PD. Tel: +44 (0) 1494 363 333 Web: www.sensing-precision.com Email: sales@sp.gb.com

Contents

The Air Leakage Finder 150

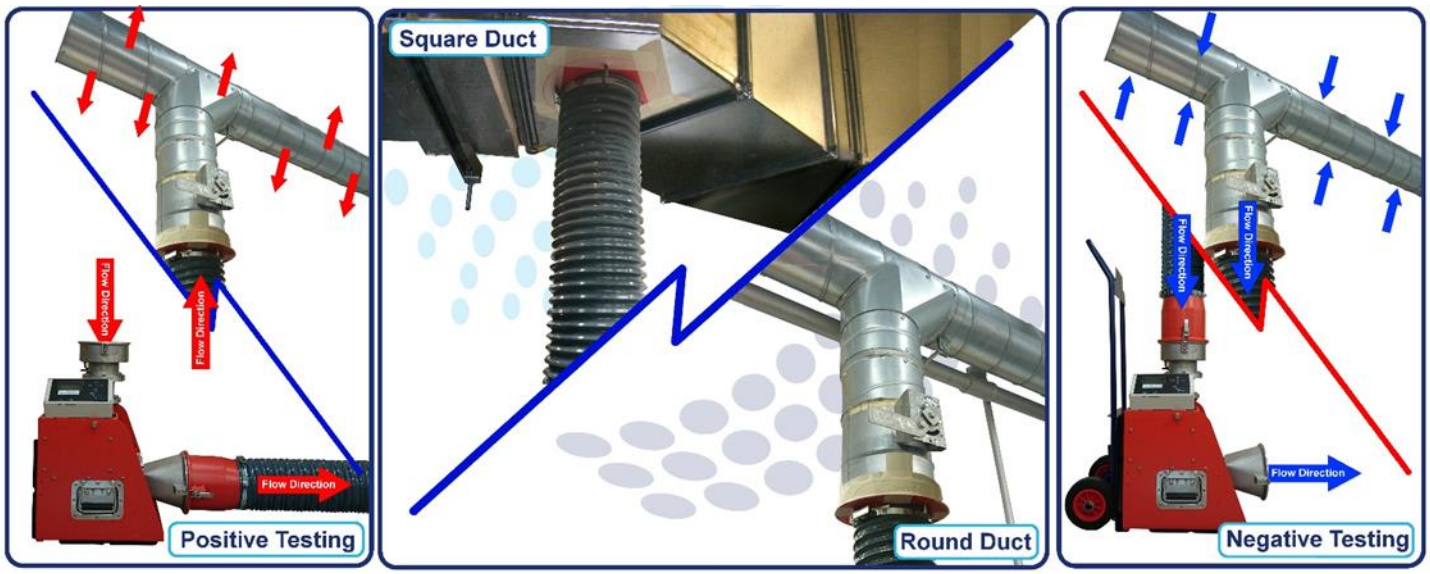
The Air Leakage Finder (ALF150) is a low cost, compact, light-weight and self-contained air measurement instrument based on a fundamental device, 'The Conical Inlet Nozzle'. It has been designed for use in the buildings commissioning industry to measure the air tightness of duct work under both Positive and Negative pressures and allows testing to DW/143, Eurovent 2/2 and SMACNA standards.

The ALF150 is supplied fully calibrated and complete with everything required to carry out a test straight from the box. With its lightweight, compact design it is suitable for a one man lift and fits neatly in boot of most small hatchbacks cars.

The menu driven, detachable handheld instrument has been made as intuitive to use as possible and gives highly accurate, direct readouts of the Test Static Pressure and the Measured Leakage Rate. The test data can be saved directly to the on-board SD card or streamed via the USB link onto a computer. Virtually no maintenance of the unit is required and a low cost, low hassle, rapid recalibration service is available.

How It Works

There are two ways of pressure testing a volume; **Positive** leakage testing**, i**n which the flexible ducting is attached to the **Outlet** side of the fan, allowing the duct to be pressurised. And **Negative** leakage testing**, i**n which the flexible ducting is attached to the **Inlet** side of the fan, allowing the duct to be depressurised.



The pressure displayed on the instrument is the Duct Static Pressure, which is the difference between the pressure in the duct (measured via the duct adaptor pressure tapping) and atmospheric pressure (measured within the instrument). The user is able to adjust the fan speed until the predetermined test static pressure is reached, at which point the leakage rate for that test pressure is displayed.

Any leakage in or out of the volume has to be compensated for by the fan in order to maintain the static pressure and the user will have to adjust the fan accordingly. The volume flow rate of the fan will therefore be equal to the leakage rate from the volume of duct under test.

ALF150's function relies on the rules followed by Conical Inlet Nozzles. These are sited on the fan inlet and have a defined relationship between the volume flow rate and the pressure developed at the throat of the nozzle. ALF150's instrumentation consists of two electronic manometers, one which measures the static pressure and the other measures the Inlet Nozzle throat pressure. Therefore ALF150 is able to measure this pressure and calculate the precise Volume Flow rate passing through the selected Conical inlet nozzle and therefore calculate the precise Leakage Rate.

This then allows an engineer determine the leakage rate of a volume, locate and seal any leaks and to monitor the progress as the leaks are sealed. As leaks within the system are located and sealed, the pressure within the volume will build above the predetermined static pressure, therefore the operator will have to make adjustments to the fan speed to ensure the static pressure is maintained to the correct level as the Leakage Rate decreases.

The Nozzles

ALF150 comes complete with three interchangeable Nozzles to cover the full leakage range of 1l/s to 155l/s.

The ø35mm and ø65mm nozzles comply with ISO 5801:2004 and the ø15mm Nozzle, has been specifically manufactured to the same specification, using an orifice plate mass flow measuring device.

Ø15mm Nozzle - 1 l/s to 12 l/s
Ø35mm Nozzle - 8 l/s to 70 l/s
Ø65mm Nozzle - 40 l/s to 155 l/s

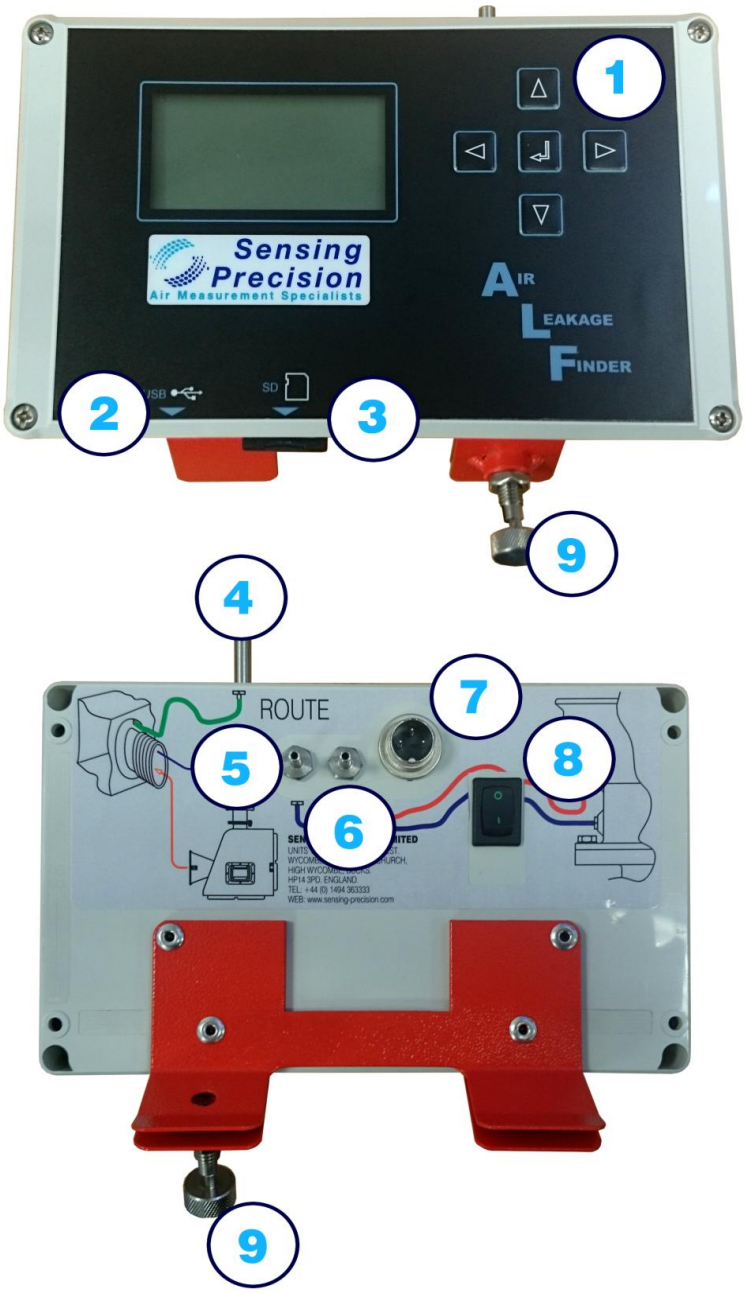
The 65mm nozzle is permanently fixed to the ALF150 and cannot be removed. The 35mm and 15mm are designed to slot in to the 65mm nozzle when required, which reduces the inlet nozzle size to the required dimensions. A soft 'clunk' indicates the nozzle has been correctly installed.
To remove the 35mm or 15mm nozzle, simply lift them out of the 65mm nozzle.

The Instrument

The ALF150 Instrument is powered directly from the AF150 unit itself. It contains an SD card slot and Mini USB type B port which allows data streaming directly to a computer terminal program.

A separate on / off switch also allows the instrument to be powered down prior to powering the ALF150 unit down.

A simple 5 button user interface makes using the ALF150 simple and intuitive. See the User Interface section for more information.



1 KEYPAD
2 USB PORT
3 SD CARD SLOT
4 STATIC PRESSURE TAPPING
5 NEGATIVE PRESSURE TAPPING (Blue)
6 POSITIVE PRESSURE TAPPING (Red)
7 POWER CONNECTOR
8 ON / OFF SWITCH
9 LOCKING PLUNGER

User Interface

Once the ALF150 has been powered up and the Instrument turned on, it will illuminate with the company loading screen. After approximately 2 seconds, the user is presented with the Main Menu.

Main Menu

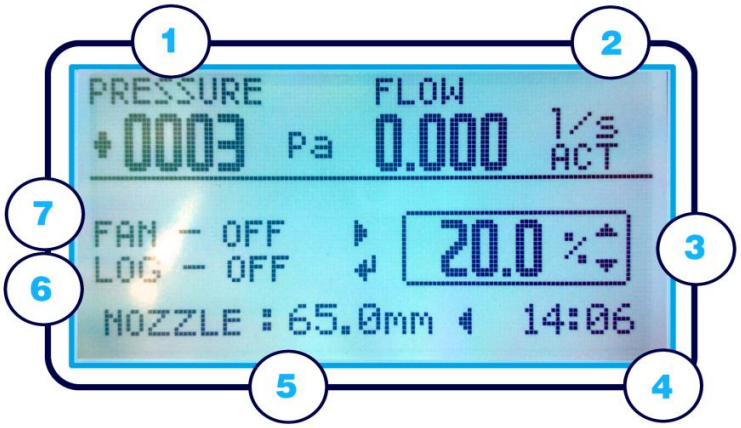
UP and **DOWN** are used to navigate through the Main Menu
ENTER is used to confirm a selection
LEFT & **RIGHT** / **UP** & **DOWN** are used to modify & change settings where applicable & **ENTER** is used to confirm settings changes and return to the Main Menu
Pressing **LEFT** from the Main Menu will display system information. Press **ENTER** to return to the Main Menu.

The full ALF150 menu and what each menu option does, is as follows:

- **START** Run main program
- **CHANGE UNITS** Change units on display (Imperial & Metric available). Also, Select Actual Leakage Rate or Standard Temperature & BP compensated Leakage Rate.
- **SET TIME / DATE** Set time & data
- **DATA SAVE FREQUENCY** Change the data save period
- **AMBIENT SETTINGS** Change Temperature & Barometric Pressure
- **SENSOR DAMPING** Change sensor averaging between 0.5 & 6.5 seconds
- **LANGUAGE** Change language (English, French or German)

Test Mode Screen

During operation of the Air Leakage Finder 150, the user is presented with the following screen. It displays all the information about the test being carried out.



1 **PRESSURE READING**
2 **FLOW RATE READING**
ACT = Actual
STP = Standard T&BP Compensated
3 **FANSPEED %**
4 **TIME**
5 **INLET NOZZLE SIZE**
6 **DATA LOGGING ON / OFF**
7 **FAN STATUS ON / OFF**

Button	Action	Operation
LEFT	Press	Changes Nozzles size
RIGHT	Press	Switch fan On/Off
LEFT and RIGHT	Hold	Zero the sensor readings
UP or DOWN	Press/Hold	Increase/decrease fan speed
ENTER	Press	Switch data logging On/Off. (Save data if in Manual Mode)
ENTER	Hold	Return to Main Menu

Changing the Instruements' Settings

Select Units

- Select Units allows lets you choose your desired units for Pressure and Flow rate.
- Use the UP and DOWN key to make your choice for pressure units, then press ENTER to confirm.
- Repeat the process for flow rate units.

Set Time & Date

- Set Time & Date allows the user to adjust the time and date.
- Once set, these setting will be indefinitely saved.
- Navigate through the time and date fields with the LEFT & RIGHT keys.
- Use UP & DOWN to change the value in that field.
- Press ENTER to confirm to save the Time & Data and return to the main menu.

Note: ALF150 automatically corrects for leap years and auto calculates the correct day of the week for the specific date set by the user. It does not currently account for day light savings.

Data Save Frequency

- Data Save Frequency allows a user to change the frequency at which data is auto logged during a test
- The highest selectable frequency is once per second, with lowest frequency being once every hour.
- Once the frequency reaches 60 seconds the value will increase in increments of 1 minute only.
- Use UP & DOWN to adjust the data save frequency.
- Press ENTER to confirm.

Ambient Settings

- Ambient Settings allows the user to adjust the ambient temperature and barometric pressure to suit their test location. Doing this ensures maximum accuracy when conducting a test.
- Use the UP and DOWN Key to adjust the temperature and select your preferred units by using the LEFT and RIGHT Key. Press ENTER to confirm.
- Repeat the process to adjust barometric pressure.

Sensor Damping

- Sensor Damping allows the user to adjust the response of the onboard sensors. Decreasing the damping tolerance to 1 will provide a true instantaneous reading. Increasing the damping tolerance up to 15 will provide and averaged reading up to a maximum of 6.5 seconds.
- Use UP & DOWN to increase the damping tolerance for the Pressure reading. Press ENTER to confirm.
- Repeat the process for the Flow Rate reading.

Note: In both tolerance settings, the range is 1 to 15. The lower the number the truer the reading will be to the instantaneous reading and it will appear less stable. The higher the number the more of an average it will be and it will appear more stable. Adjust the damping tolerance to suit your test requirements.

Language

- Language allows a user to change the language in which data is displayed.
- Choose your language by using the UP and DOWN key and presses ENTER to confirm.

Data Storage & Streaming

Data Logging allows the user to save the data from a test in real time to the SD card, at a predetermined interval period set by the user. This data is also streamed via the USB port to a computer with access to a terminal program, allowing the user to simply copy the data to a program where it can be formatted. The data saved on the SD card is in a .CSV format, and can be opened and edited in a spreadsheet program.

Manual Data Logging functions in the same way as Data Logging, only, the user has to manually save the data as and when required by pressing the ENTER key on the keypad. This allows the user to snapshot save data rather than continuously save data.

Each test report stored on the SD card contains the relevant test information such as the date, time, ambient temperature, ambient barometric pressure as well as the test data itself. Each report is numbered sequentially and is stored in chronological folder system.

The save directory is as follows: LOGS/MONTH/DAY/test.CSV

For example, test number 36 on the 6th August 2015 is located in the following location:

"***LOGS/AUG/6/0036.CSV"***

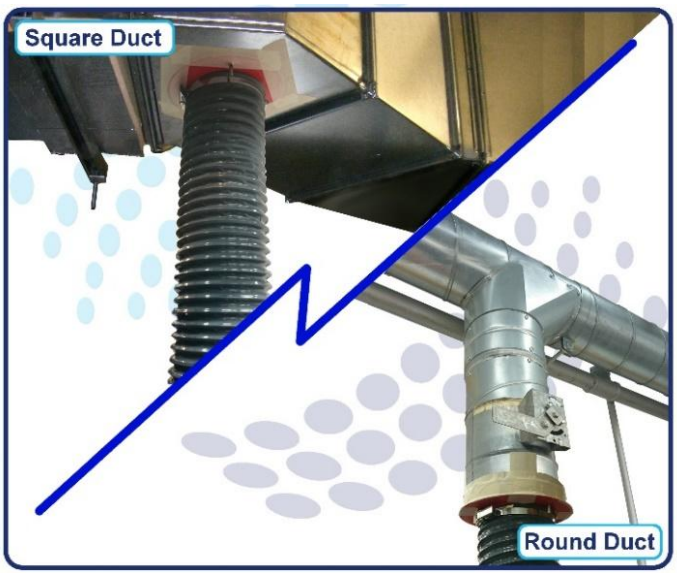
The test data recorded is as follows;

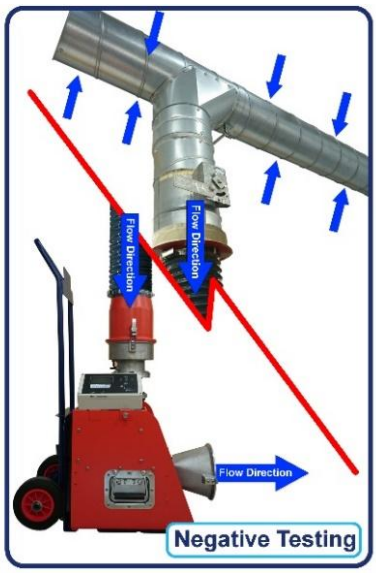
Time, Static Pressure, Leakage Rate, Fan speed, Nozzle size

Pre-Test Procedure

1. Connect the ALF 150 to the correct power supply using the power lead supplied.
2. Move the ALF150 into position so that it can be setup with little risk of personnel tripping over the duct, cables or tubes during testing.

3. For best performance, position the ALF150 so the flexible duct is as straight as possible.
4. Connect the flexi ducting to the fan inlet (Negative testing) or the outlet (Positive testing) and secure in place with toggle clamps.





5. Securely fix the duct adaptor plate to the ductwork.
6. Ensure the duct length to be tested is sealed off where appropriate.

7. Connect the duct pressure tapping to the instrument pressure tapping.

8. If the static pressure tapping on the duct adapter does not fit within the duct, an additional pressure tapping on the duct will be required.

*The system is now ready to implement the **Procedure for Leakage Testing**.*

Procedure for Leakage Testing

The same procedure is followed for both Positive and Negative pressure testing. The only difference is that the flexible ducting is attached to either; the fan inlet for Negative testing or fan outlet for Positive testing.

WARNING: When in Negative Test Mode ALF150 is capable of generating 2500 Pa of Pressure. Please take care when testing duct work under negative pressure.

1.1 Ensure you have completed steps detailed within ***Procedure Prior to Leakage Testing***.
1.2 Switch the Main Power Switch to **ON**.
1.3 Switch the instrument **ON**.
1.4 Instrument settings are loaded with previous user settings, or defaults for first time use. Adjust if required prior to test.
1.5 Start Main Test Program by selecting "START" and pressing the "ENTER" key.
1.6 Set the required fan speed and turn the fan on by pressing the "RIGHT" key.

WARNING: *Once activated, the fan will ramp up to the speed set on the instrument. It is recommended that when commencing a new test the fan speed is set low before turning the fan on.*

1.7 Increase/decrease the fan speed until you reach the required test pressure. Should the required pressure not be achievable and/or the flow rate is shown to be zero, see the ***Changing Nozzle Section***
1.8 If you wish to save the data to the SD card, press the "ENTER" key to start saving data at your set frequency. Or if in manual mode, push to log the data as required.
1.9 Check all pressure connections and duct joints for leaks.
1.10 Seal any obvious leaks.
Note: *It is recommend that after each leak is sealed the user return to the appliance and return to* ***1.7****.*

1.11 Once the test is fully complete the unit can be powered down and then disconnected. Push and hold "ENTER" to return to main menu. The fan will stop automatically when returning to the main menu. It is advised that you switch off the ALF150 unit at the mains only once the fan is at rest.

Changing Nozzles

If at any time the leakage rate is Zero, then a smaller nozzle will be required. If the required test pressure cannot be reached, then the leak is too big and a larger nozzle is required.

To Change a Nozzle:

1.1 Turn the fan to OFF via the instrument.
1.2 Wait for the fan to become stationary.

WARNING: Do not change nozzles with the fan running.

1.3 *Negative Mode Only* – Unclip and remove flexi duct adaptor from fan inlet.
1.4 Remove the in situ nozzle, if present and place in nozzle storage box.
1.5 Insert replacement or use fixed nozzle.
1.6 *Negative Mode Only* – Reattach flexi duct to fan inlet.
1.7 Zero the instrument before the fan is turned back on.

Routine Maintenance

Routine Checks:

- Check the flexible hose for rips and tears and that it is securely connected to both the duct adaptors and hose coupling.
- Check integrity of pressure tubes and their connections to the instrument and nozzle tappings.
- Check power lead for damage
- Check nozzles for dents, chips and large scratches.
- Check O-rings for damage and ensure they are thoroughly lubricated.

Replace components as necessary – Spares available from sales@sp.gb.com or +44 (0) 1494 363 333.

Service and Calibration

Instrument Pod:

- The Instrument Pod should be returned to Sensing Precision annually for calibration.
- To obtain a quotation to order against please email: sales@sp.gb.com

Nozzles:

- The nozzles are designed and checked against a primary standard at manufacture and therefore they do not require calibration. They should be inspected regularly for any damage as this may affect their performance.
- If you are concerned about the integrity of the Ø35mm or Ø15mm replacement nozzles are available from sales@sp.gb.com.
- For the Ø65mm fixed nozzle please refer to the **Full Unit** service section**.**

Full Unit:

- Should the full unit develop fault or be damaged the unit can be returned to us for servicing and repair.
- It is recommended that the full unit is returned to us every 3 years for a full inspection and service.

Please contact sales@sp.gb.com before returning your unit!

Electrical Safety:

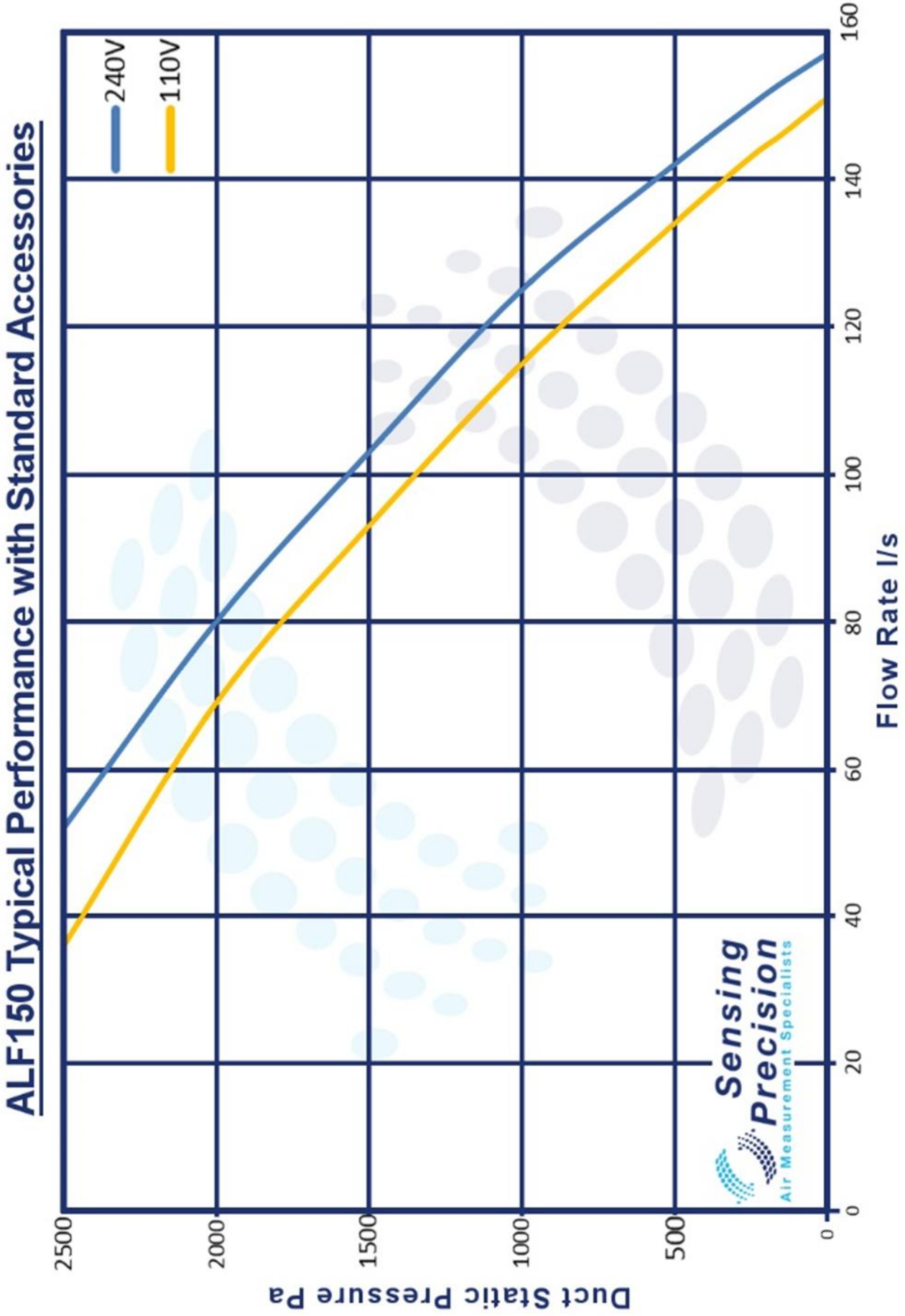
- Both active components within the main unit are internally fused with a non-replaceable device.
- Should incorrect voltage/spikes be applied to the unit or another event occurs that causes a fuse to blow, please contact us to arrange repair/replacement of the affected parts.
- No user serviceable parts are contained within the unit and all servicing should be referred to the manufacturer as many connections inside the unit could be at mains potential.
- Electrical cable should be checked regularly for damage and replaced if insulation or plugs/sockets are damaged.
- For optimum safety the unit should be used on an RCD/Earth Leakage protected circuit as well as a sensibly sized over current trip.

Warranty:

- The product is supplied with a two year limited warranty against manufacturing defects and component failure but excludes damage caused through misuse, repair of which will be quoted prior to commencement of work. The warranty is also subject to the recommended service and calibration schedule being followed.

Please contact sales@sp.gb.com *before returning your unit for service or repair & to order Spare Parts.*

Performance Curve



ALF150 Specification

Volume Flow Measurement	1 l/s to 150 l/s over nozzle ranges
Pressure Measurement Range	± 2500 Pa
Typical Duty Points	70 l/s at 2000Pa, 140 l/s at 500Pa
Pressure Measurement Accuracy	± 1% of reading ± 1 digit
Leakage Flow Accuracy	± 2.5% of reading ± 1 digit
Resolution	1Pa
Power	400W
Voltage	230Vac 50/60Hz (or 115Vac 50/60Hz available)
Unit Size	35 (W) x 46 (D) x 80 (H) cm
Unit Weight	20kg
Carry Case (c/w Accessories) Size	45 (W) x 45 (D) x 55 (H) cm
Carry Case (c/w Accessories) Weight	10.5kg
Clip on Trolley Size	38 (W) x 20 (D) x 94 (H) cm
Clip on Trolley Weight	6.7kg

Notes:

Sensing Precision
Air Measurement Specialists

Sensing Precision Limited

Units 15-16, C.R. Bates Industrial Estate,

Wycombe Road, Stokenchurch,

High Wycombe,

Buckingham

United Kingdom

HP14 3PD

Tel: +44 (0) 1494 363 333

Web: www.sensing-precision.com

Email: sales@sp.gb.com

Registered in England No. 07878150