

**ATEQ Leak/Flow Calibrator
(CDF)
Version 1.5**



www.ateq.com

REVISION OF THE CDF USER MANUAL

| <u>Edition/Revision</u> | <u>Reference</u> | <u>Date</u> week/year | <u>Chapters updated</u> |
|-------------------------|------------------|--------------------------|--|
| First edition | UM-16300C-U | 02/01 | ----- |
| Second edition | UM-16300D-U | 15/01 | Version 1.2 > 1.3 Chapters 3 and 4 |
| Third edition | UM-16300E-U | 43/02 | Version 1.3 > 1.4 Chapter 4, automatic switch, automatic zero. |
| Fourth edition | UM-16300F-U | 20/2005 | Evolution of the instrument from the 1.4 version to the 1.5 version. |
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| | | | |
| | | | |

Recommendations

Precautions on the test environment :

- Let the test area dry and clean, free from explosive gas.

Precautions on the operators :

- **ATEQ** recommends that the operators using the instruments should have a suitable qualification and training with respect to the work bench requirements.

General precautions :

- Read the users manual before using the instrument
- All electrical connections coming to the instrument must be equipped with a safety system (fuse, circuit breaker...) adapted to the needs and adhering to the norms
- To avoid electromagnetic interference, the cable connections to the instrument should be less than 2 meters in length.
- The electrical main supply must absolutely have proper earth
- Disconnect the electrical connections to the equipment for maintenance
- Cut the air supply for all kinds of interventions on the pneumatic assembly
- Do not open the instrument under power voltage
- Avoid water spillage in the direction of the instrument
- **ATEQ** is at your disposal for any further information concerning the use of the instrument under maximum safety conditions



We would like to bring to your attention that ATEQ will not be held responsible for any accident connected to the improper use of the instrument, to the work bench or to the lack of compliance with safety rules.

ATEQ Company is free from any responsibility for any adjustment of its instrument which would not have been done by its own technicians.

ATEQ, THE ASSURANCE OF A COMPETENT AFTER SALES SERVICE

■ THE ATEQ AFTER SALES SERVICE IS :

- a team of qualified technicians,
- a permanent telephone assistance,
- agencies close to you for faster reaction,
- a stock of spare parts available immediately,
- a car fleet for rapid intervention,
- a commitment to quality ...

■ THE OVERHAUL

ATEQ carries out the overhaul of your instruments at interesting prices.

The overhaul corresponds to the maintenance of the instrument (checking, cleaning, replacing of used parts) as part of preventive maintenance.

Preventive maintenance is the best way to guarantee reliability and efficiency. It allows the maintenance of a group of instruments in good operational order and prevent eventual break-downs.

■ MAINTENANCE KITS

The ATEQ After Sales Service proposes, two kits destined for the preventive maintenance of the pneumatic circuits of instruments.

■ CALIBRATION

This may be carried out on site or in our offices.

ATEQ is attached to the COFRAC and delivers a certificate following a calibration.

■ TRAINING COURSES

In the framework of partnership with our customers, ATEQ offers two types of training in order to optimise the usage and knowledge of our instruments. They are aimed at different levels of technician:

- method / control training,
- maintenance / upkeep training.

■ A TARGETED TECHNICAL DOCUMENTATION

A number of technical documents are at your disposal to allow you to intervene rapidly in the event minor breakdowns:

- problem sheets describing and offering solutions to the main pneumatic and electronic problems,
- several maintenance manuals.

■ A QUALITY GUARANTEE

The instruments are guaranteed for parts and labour in our offices:

- 2 years for leak detection equipment,
- 1 year for electrical tests to norms instruments,
- 1 year for the accessories.

Our After Sales Service is capable of rapidly answering all your needs and queries.

**ATEQ recommends
to made realise by its departments
a revision and a calibration of the instruments
every year**

PREFACE

Dear Customer,

You have just purchased an **ATEQ** instrument, we thank you for the trust you have placed on our brand. This instrument has been designed to ensure a long and unparalleled life expectancy, and we are convinced that it will give you complete satisfaction during many long years of operation.

In order to maximise the life expectancy and reliability of your **ATEQ** instrument, we recommend that you install this instrument on a secured workbench and advise you to consult this manual in order to familiarise yourself with the functions and capabilities of the instrument.

Our **ATEQ** After Sales Service centre can give you recommendations based on your specific operation requirements.

ATEQ

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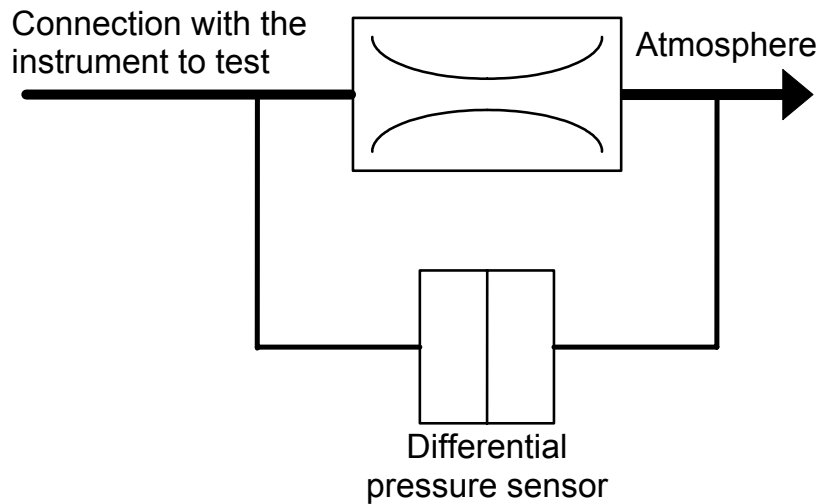
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PREAMBLE

1. MEASUREMENT PRINCIPLES

The **ATEQ Leak/flow calibrator** is a multiple range flow meter destined for checking leak instruments and in particular those of **ATEQ**. It measures a loss of charge using a differential sensor placed on the terminals of a calibrated flow tube. It can also be used for checking a leak flow or a calibrated jet.

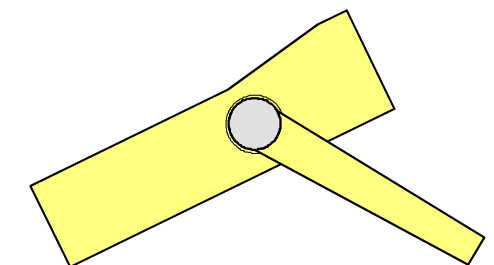


2. MEASUREMENT CHARACTERISTICS

| MEASUREMENT | RANGE | ACCURACY X = measured value | RESOLUTION |
|----------------------------|--------------------------------|--|--------------|
| Leak1 | [0] 0 to 2 ml/min | +/- (2,5 % of the flow + 0,003 ml/min) | 0,001 ml/min |
| Leak 2 | [1] 2 to 20 ml/min | +/- (2,5 % of the flow + 0,03 ml/min) | 0,01 ml/min |
| Leak 3 | [2] 20 to 200 ml/min | +/- (2,5 % of the flow + 0,3 ml/min) | 0,1 ml/min |
| Leak 4 | [3] 200 to 2000 ml/min | +/- (2,5 % of the flow + 3 ml/min) | 1 ml/min |
| Leak 5 (OPTION)* | [4] 2000 to 20000 ml/min | +/- (2,5 % of the flow + 30 ml/min) | 10 ml/min |
| Leak 6 (OPTION)* | [4] 400 to 4000 l/h | +/- (2,5 % of the flow + 6 ml/min) | 2 l/h |
| Leak 7 (OPTION)* | [4] 1000 to 10000 l/h | +/- (2,5 % of the flow + 15 ml/min) | 5 l/h |
| Pressure | Empty to 10 bar | +/- (1,5% of the pressure + 15 hPa) | 0,003 bar |
| Atmospheric pressure | 950 to 1050 mbar | 1% of X + 3 digits | 1 mbar |
| Temperature | + 15 to + 35°C | 1 % | 0,1°C |

*** Only one option at a time for range [4] (choice of: leak 5 or leak 6 or leak 7)**

Note: the above specifications are available for a CDF instrument posed on a horizontal surface and inclined with 45° with its rotary handle.



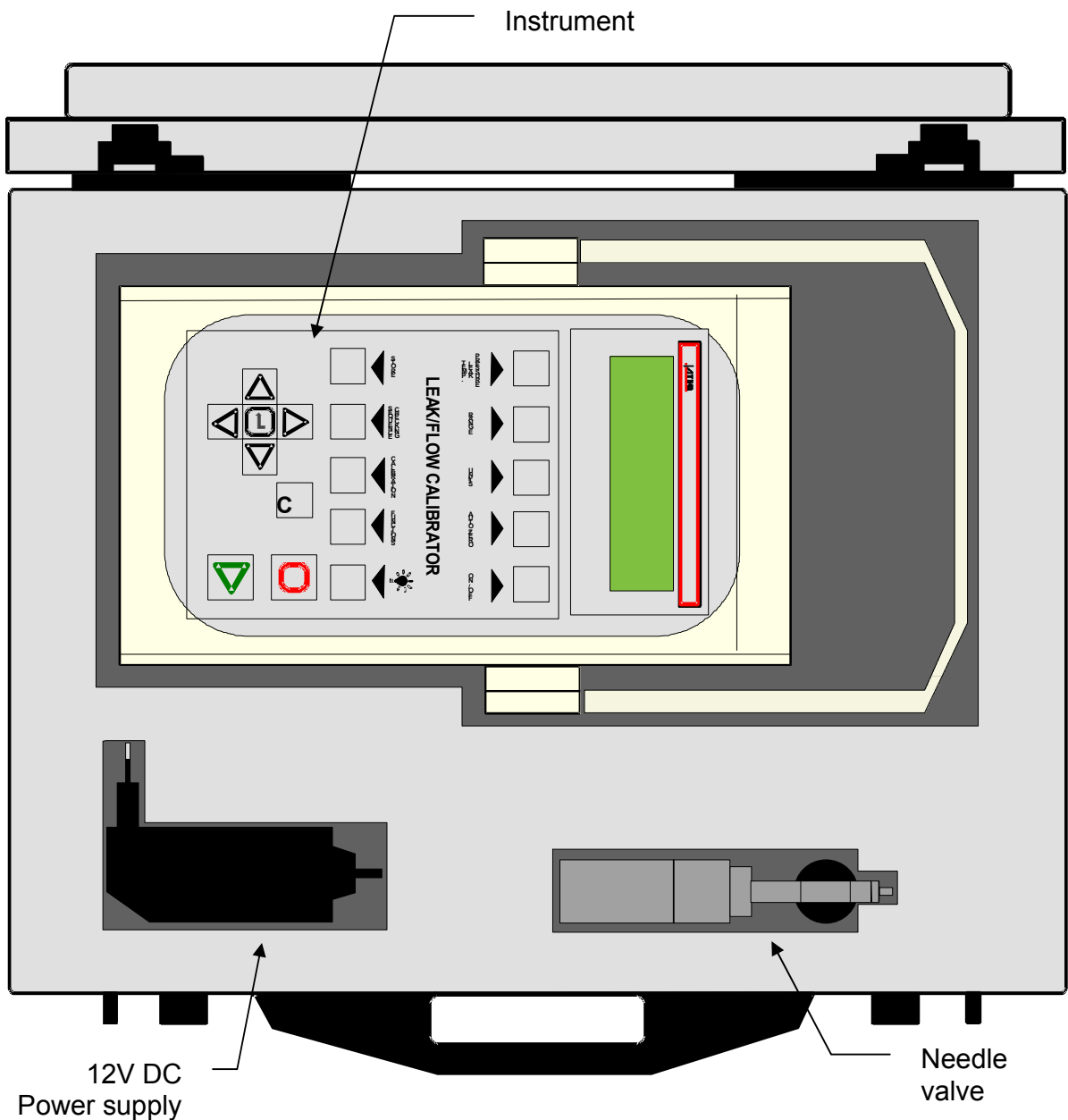
Chapter 1

INSTALLATION OF THE ATEQ LEAK/FLOW CALIBRATOR

1. DESCRIPTION OF THE CASE

The instrument is supplied with a DC 12V electric mains power supply charger, 1 valve which allows a flow to be generated, a connection tube, the user manual and a verification certificate (a calibration certificate is available as an option).

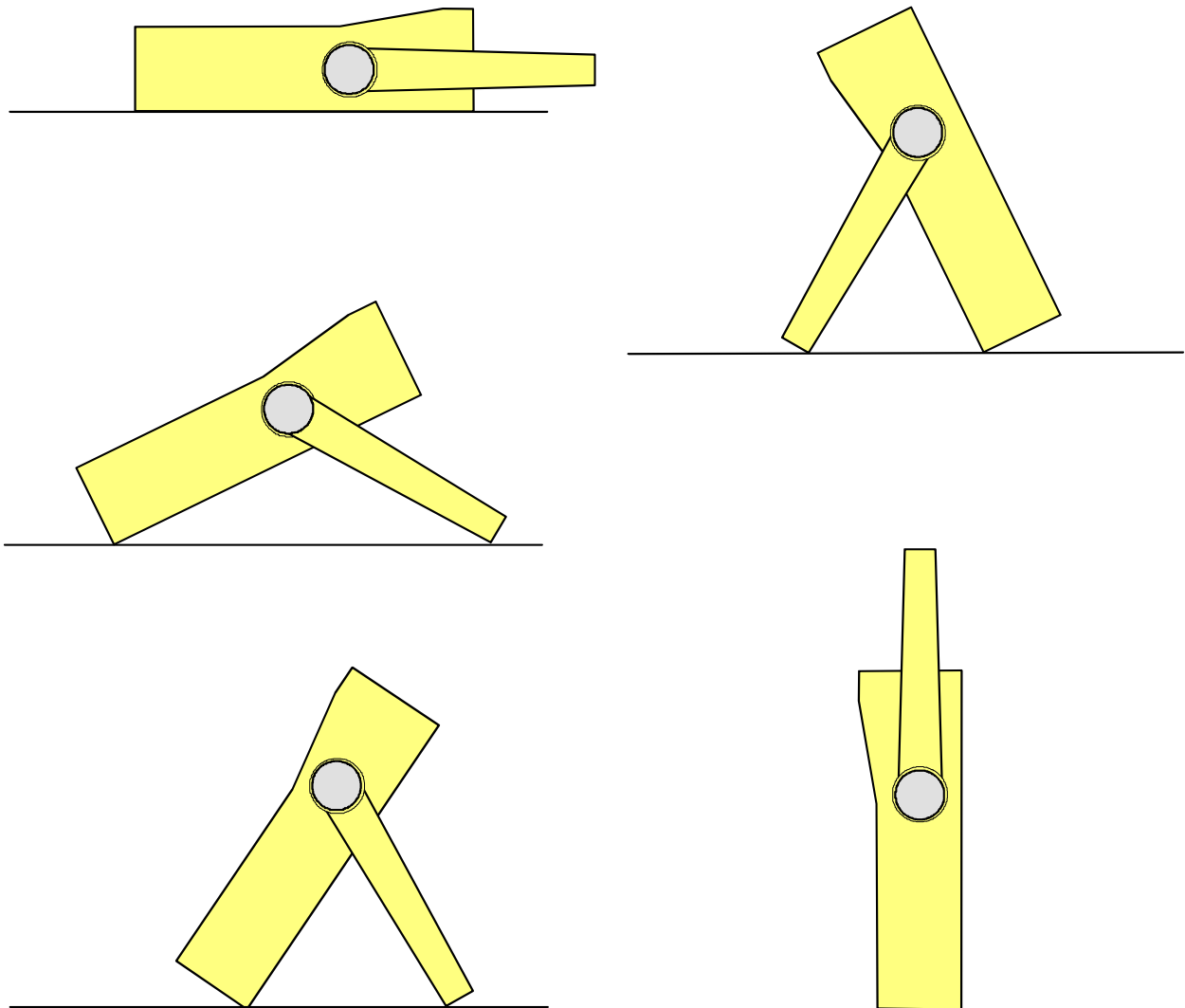
The waterproof carry case presented below is available as an option.



2. INSTALLATION OF THE INSTRUMENT

The instrument casing is fitted with a rotary handle which turns through 360° and which has 12 locking notches, thus offering multiple positions for use. To release the handle, simply press simultaneously on the two grey buttons found on each side of the instrument in the axis of the handle.

The instrument can therefore be positioned flat, suspended vertically or in intermediary inclined positions.



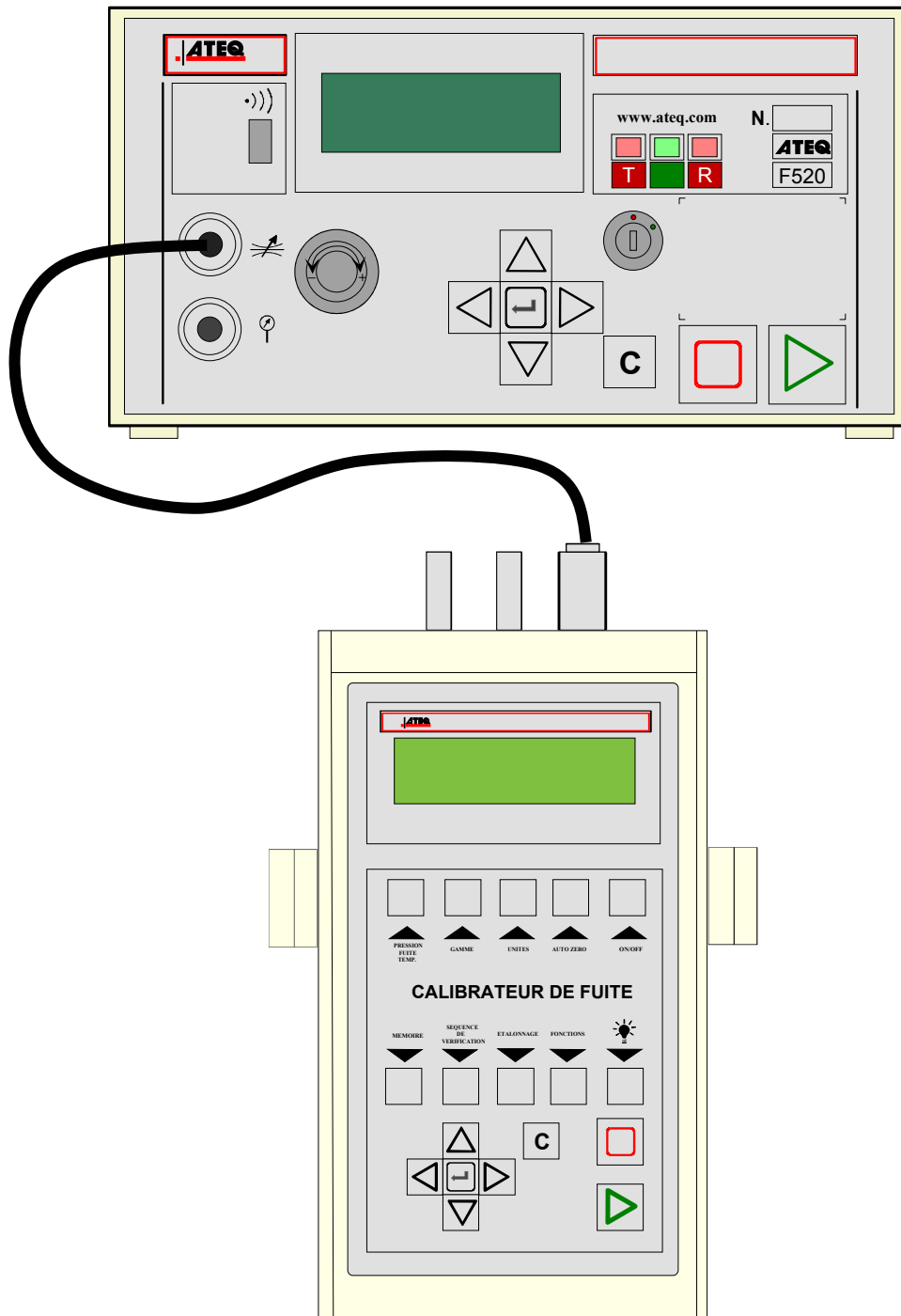
3. PNEUMATIC CONNECTION

The connection to the test instrument is on the rear panel of the instrument.

The **Leak/Flow calibrator** can carry out a measurement of pressure and a measurement of leakage.

3.1. CONNECTION FOR THE MEASUREMENT OF PRESSURE

The connection is on the test instruments pressure circuit (Regulator circuit).

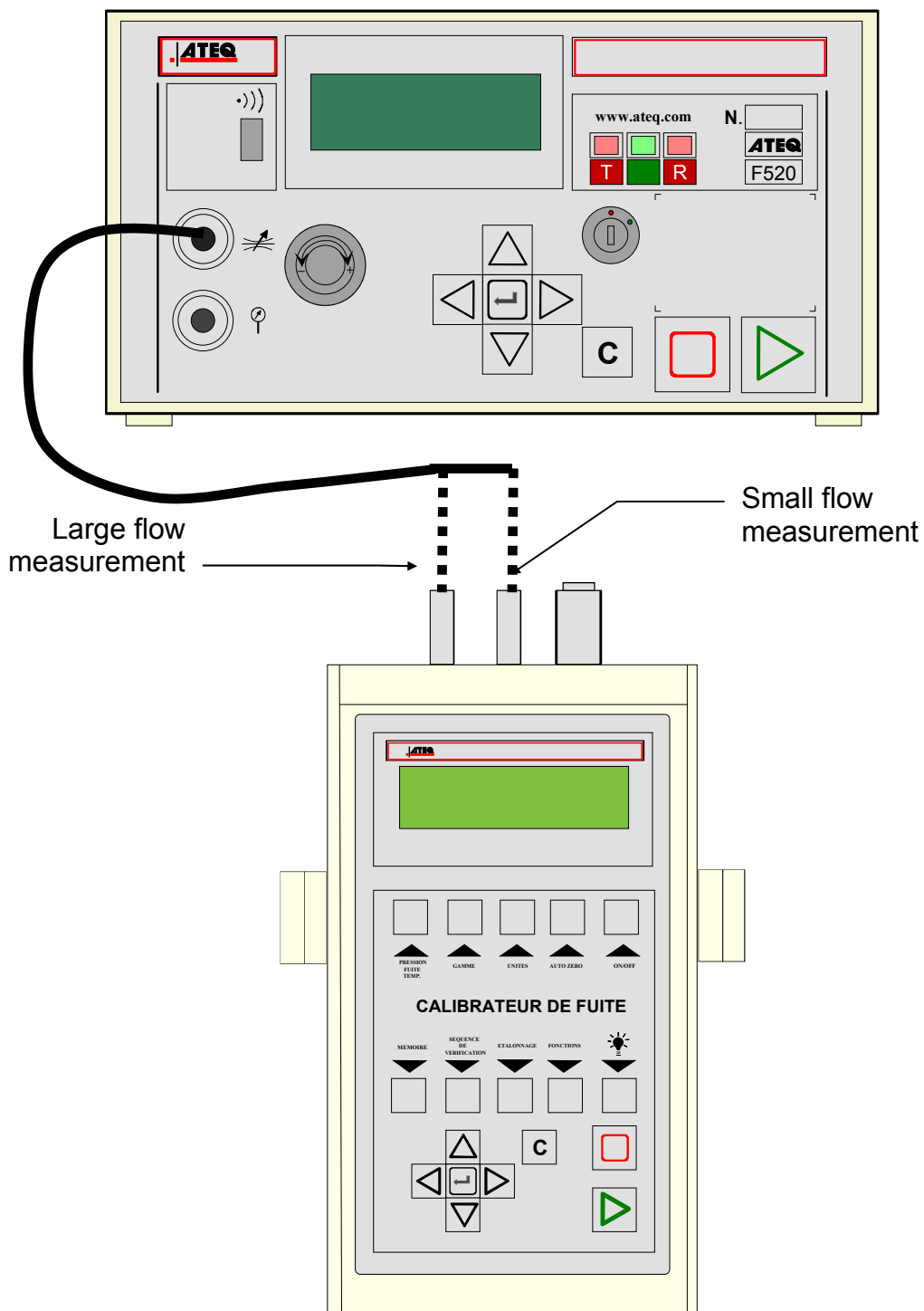


3.2. CONNECTION FOR THE MEASUREMENT OF FLOW

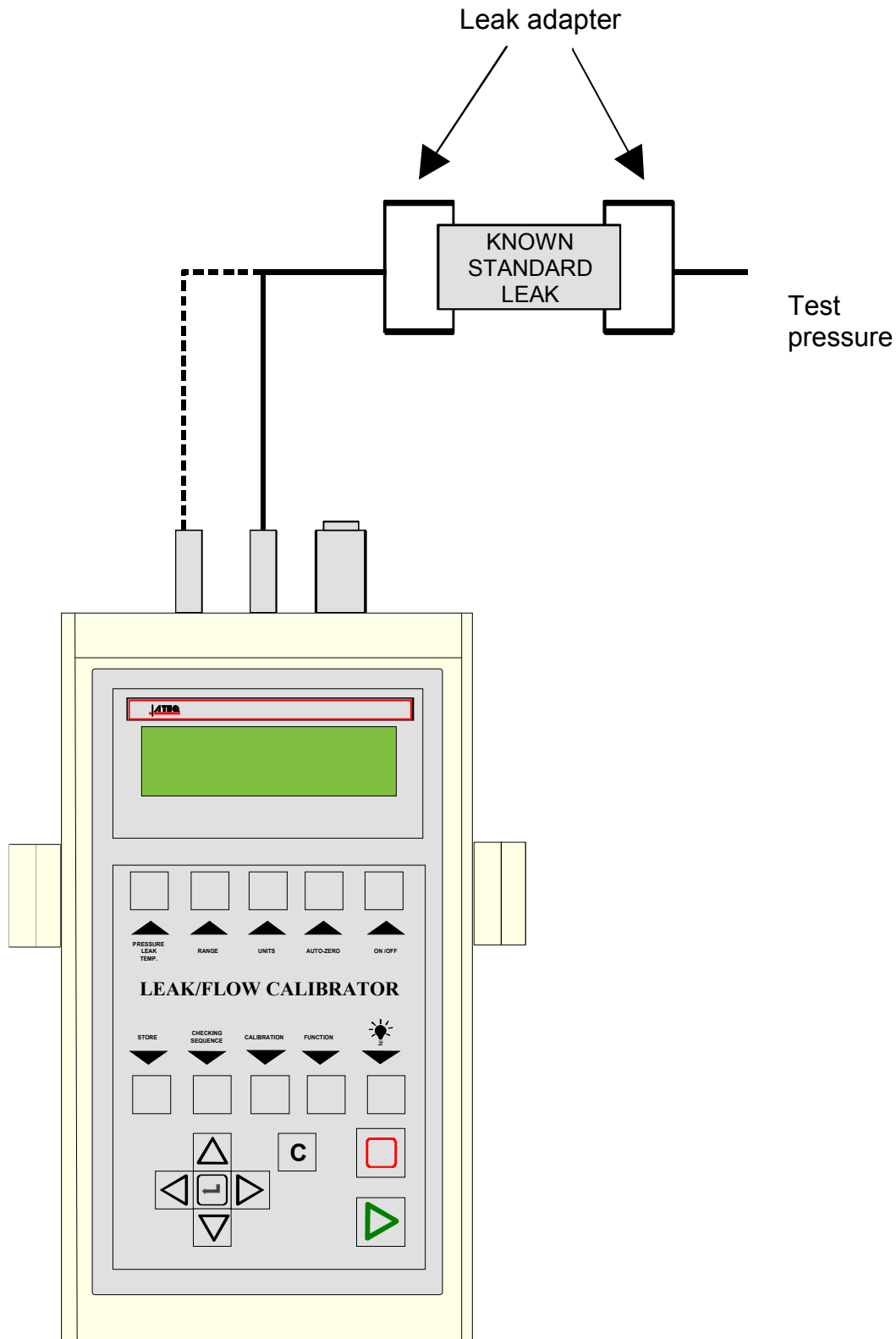
The connection is made on the measurement circuit of the test instrument.

The **Leak/Flow Calibrator** possesses two leakage measurement test couplings :

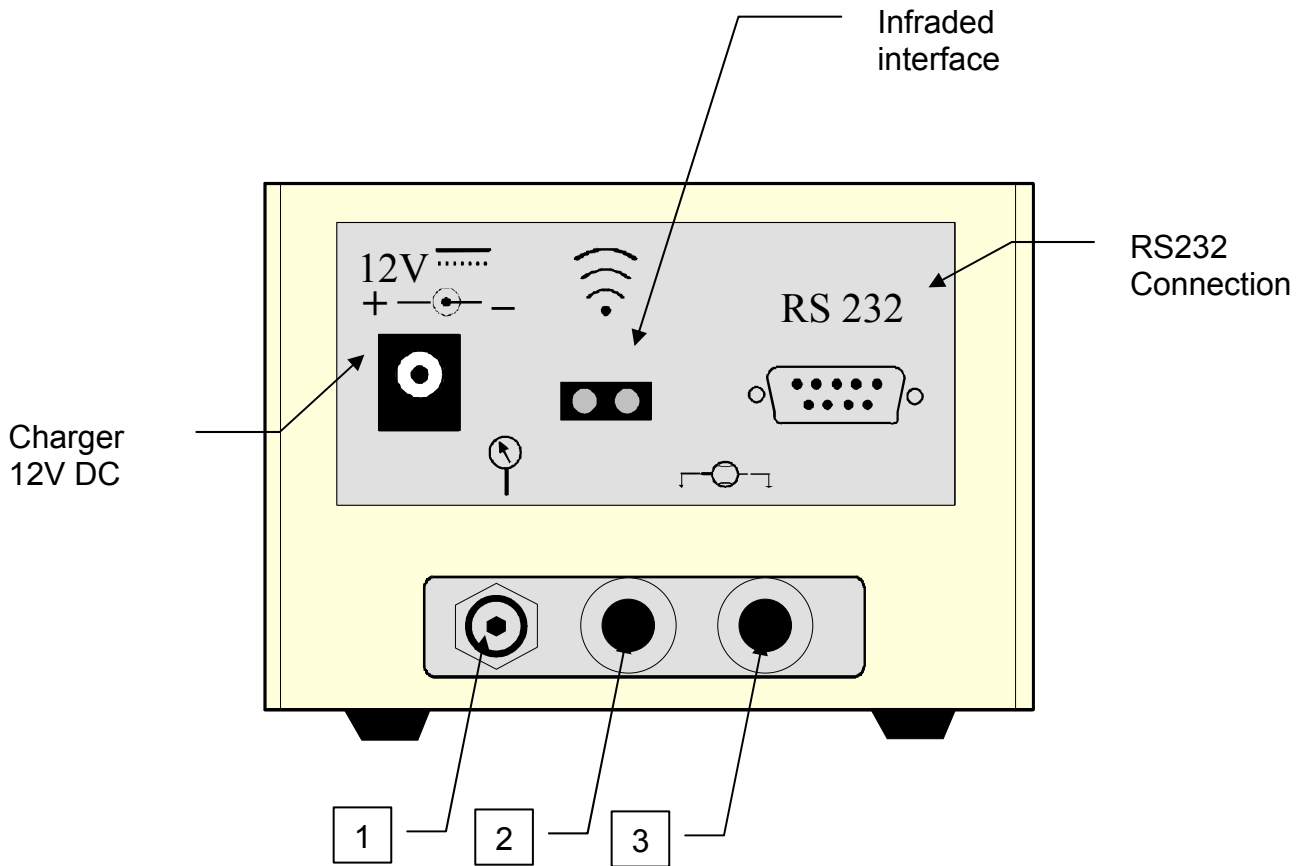
- a small flow coupling (0.001 à 20.00 ml/min),
- a large flow coupling (20.00 à 2000.00 ml/min),
- **the small flow coupling is also used to connect an optional external gauge (2000 to 20000 ml/min or 400 to 4000 l/h or 1000 to 10000 l/h).**



3.3. CONNECTION FOR CALIBRATION OF A KNOWN STANDARD LEAK

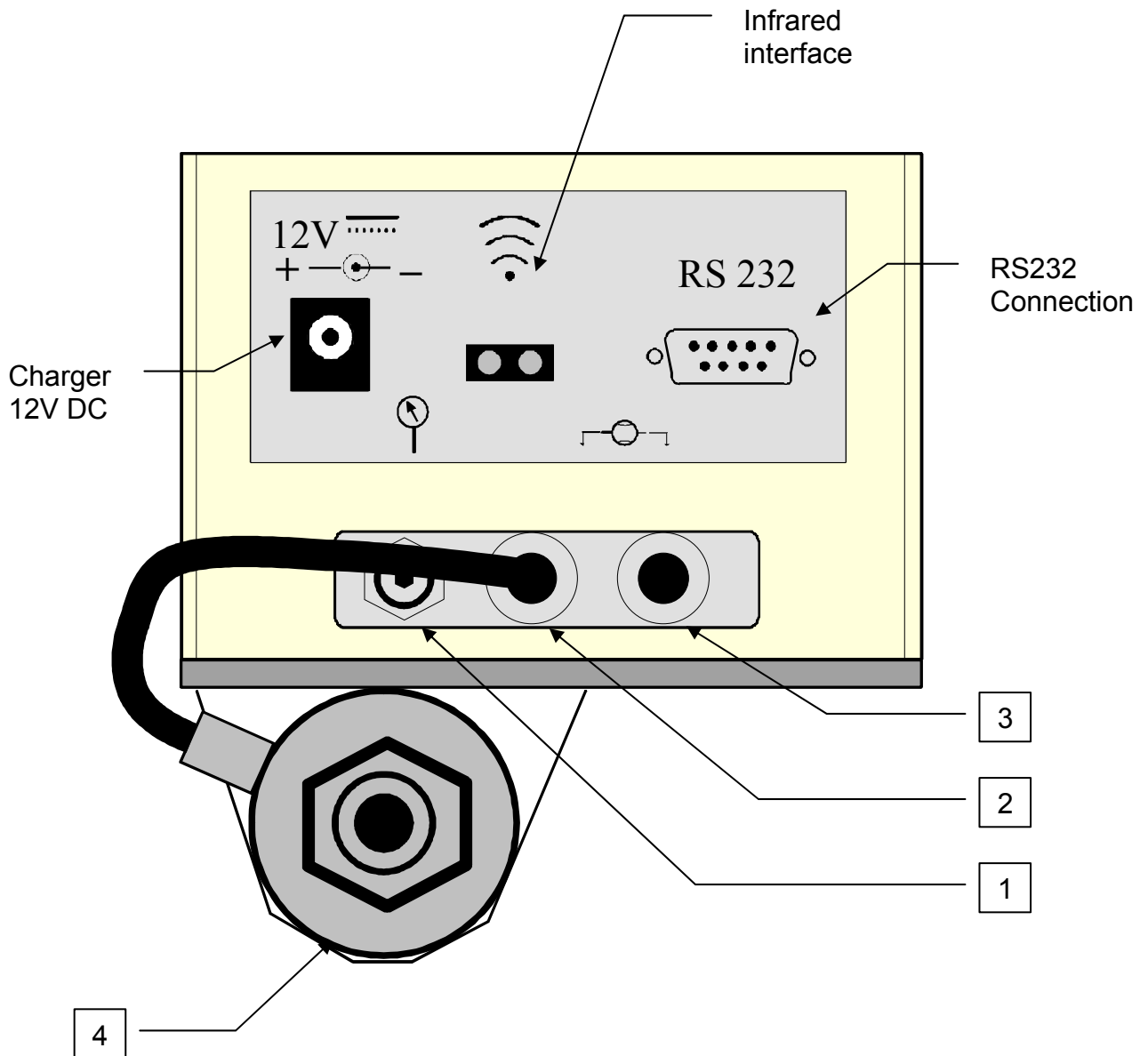


4. REAR PANEL



- 1) Pressure measurement 10 bar max.
- 2) Small flow measurement 20 ml/min max.
- 3) Large flow measurement 2000 ml/min max.

5. REAR PANEL (WITH OPTIONAL EXTERNAL GAUGE)



- 1) Pressure measurement 10 bar max.
- 2) Small flow measurement 20 ml/min max.
- 3) Medium flow measurement 2000 ml/min max.
- 4) Large flow measurement 20000 ml/min max or 4000 ml/min max or 10000 l/h max (the gauge must be connected to the small flow coupling) *.

* depending on option

6. POWER SUPPLY

The power supply to the instrument is carried out by a DC 12V charger connected to the rear of the instrument.

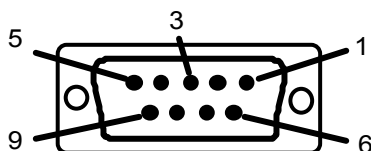
⇒ **Do not under any circumstance use a charger other than the one delivered with the instrument.**

The instrument is supplied with an internal battery which can run for about 5 hours without recharging. The charge time is around 3 hours.

7. INSTRUMENTS/ATEQ INTERFACE

The instrument can communicate within its environment through the intermediary of serial links.

7.1. RS232 CONNECTOR



| | |
|-------|------------------|
| PIN 1 | Not used |
| PIN 2 | RXD receive data |
| PIN 3 | TXD send data |
| PIN 4 | Not used |
| PIN 5 | Earth |
| PIN 6 | Not used |
| PIN 7 | RTS |
| PIN 8 | CTS |
| PIN 9 | Not used |

Note: to avoid electromagnetic interference, the cable connections to the instrument should be less than 2 meters in length.

7.2. INFRARED INTERFACE

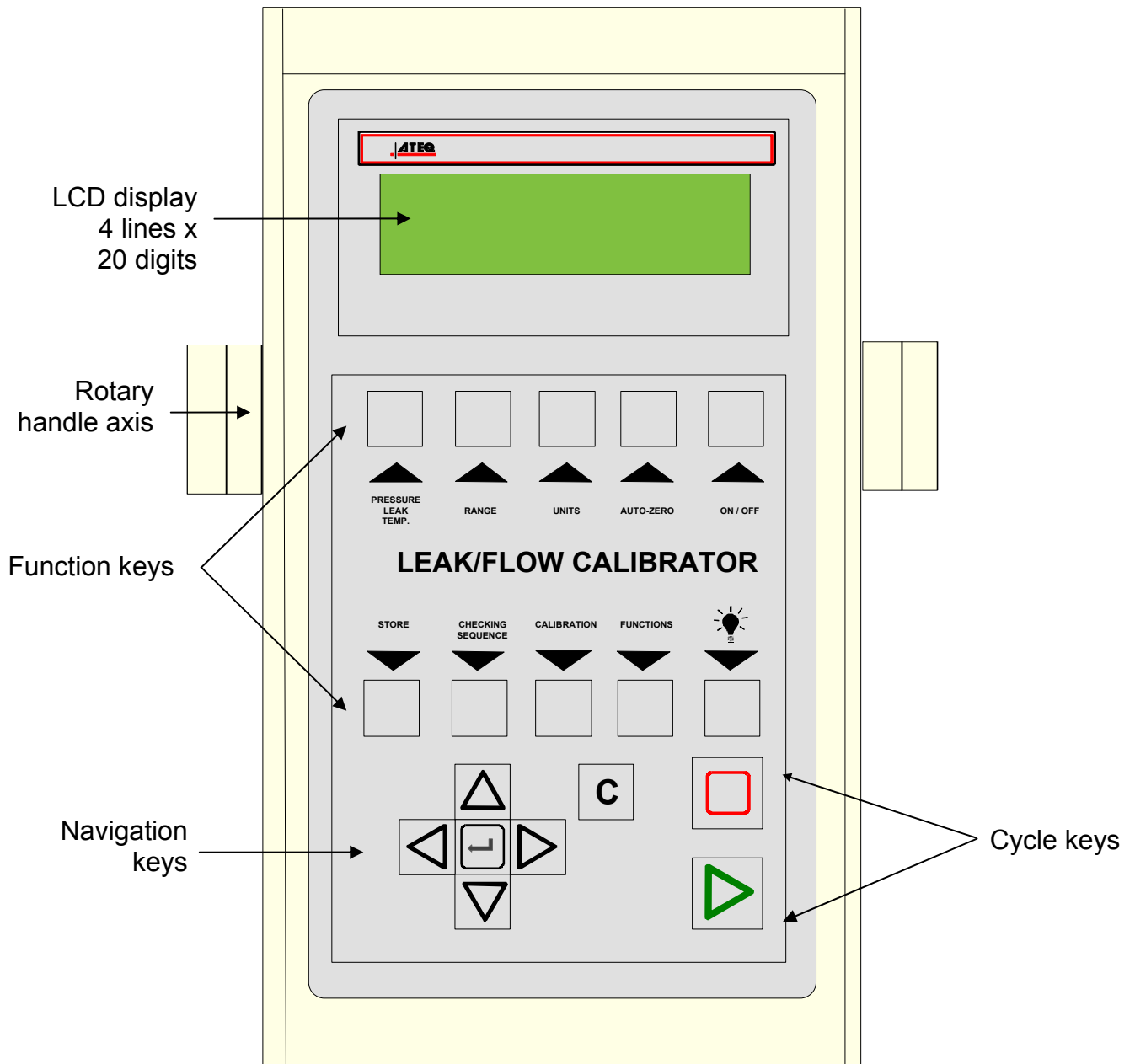


Infrared interface: not used.

Chapter 2

USER INTERFACE

1. DESCRIPTION OF THE FRONT PANEL

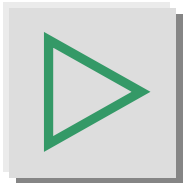
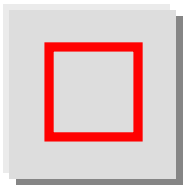


The keyboard is separated into three groups of keys:






- the cycle keys,
- the function keys,
- the navigation keys.

2. DESCRIPTION OF THE KEYBOARD KEYS

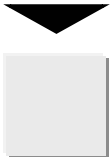
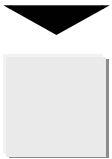
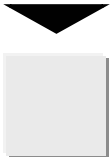
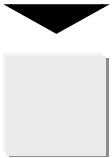
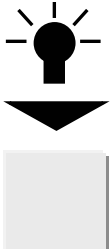
2.1. CYCLE KEYS

| KEY | FUNCTION |
|---|---|
|  | <p>Start a measurement cycle</p> |
|  | <p>Stop the measurement cycle in progress</p> |







2.2. FUNCTION KEYS (UPPER ROW)

| KEY | FUNCTION |
|---|--|
|  <p>PRESSURE LEAK TEMP</p> | <p>Change from display of three values to displaying one at a time : leak measurement, pressure measurement, temperature measurement, atmospheric pressure measurement, leak measurement with calculation of average.</p> |
|  <p>RANGE</p> | <p>Select measurement range Choice of: range 0, range 1, range 2, range 3, range 4 (OPTION), automatic mode.</p> |
|  <p>UNITS</p> | <p>The units may be expressed in two modes: USA units and SI units. The unit is set using the FUNCTIONS key in the UNITS menu. Choice of measurement units in SI. mode. Leak : ml/min ml/s ml/h l/h Pressure : bar psi kpa Mpa Temperature : °C °F Atmospheric pressure : bar psi kPa MPa Choice of measurement units in USA mode. Leak : in³/s in³/min in³/h ft³/h cm³/min cm³/s cm³/h Pressure : bar psi kPa MPa Temperature : °C °F Atmospheric pressure : bar psi kPa MPa</p> |
|  <p>AUTO ZERO</p> | <p>Sensor reset.</p> |
|  <p>ON OFF</p> | <p>On/Off switch.</p> |

2.3. FUNCTION KEYS (LOWER ROW)

| KEY | FUNCTION |
|--|--|
| <p>STORE</p>  | <p>Memorisation of a measurement and/or "data hold" function.</p> |
| <p>CHECKING SEQUENCE</p>  | <p>Starting a pre-programmed measurement sequence.</p> |
| <p>CALIBRATION</p>  | <p>Not used.</p> |
| <p>FUNCTIONS</p>  | <p>Access to particular functions of the instrument.</p> |
|  | <p>Display backlight (Switched off automatically after 5 minutes if not used).</p> |

2.4. NAVIGATION KEYS

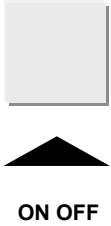
| KEY | FUNCTION |
|---|---|
|  | Scroll up, or increase numeric values. |
|  | Scroll down, or decrease numeric values. |
|  | Not used. |
|  | Not used. |
|  | Entering a menu. Editing of a parameter. Validation of a parameter. |
|  | Return to the previous menu or the previous function. Exit without modification of a parameter |

Chapter 3

START-UP ADJUSTMENTS AND MEASUREMENTS

1. POWER UP OF THE ATEQ LEAK/FLOW CALIBRATOR

The **Leak/Flow Calibrator** may be operated with the charger connected or using its integrated battery.

| | |
|---|---|
|  <p style="text-align: center;">ON OFF</p> | <p>The instrument is powered up by pressing on the ON/OFF switch.</p> <p>ON: Switch on.</p> <p>OFF: Switch off.</p> <p>If the battery is low, the readout will display a message.</p> |
|---|---|

Check the pneumatic and electrical connections before powering up the **Leak/Flow Calibrator**.

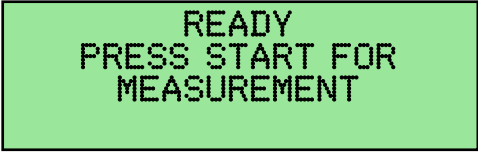

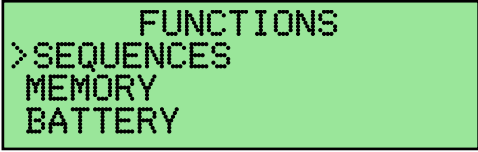

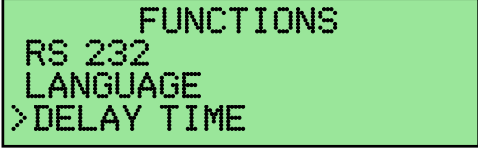

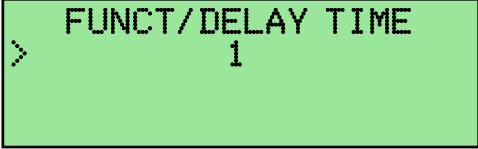

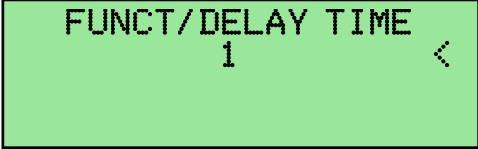


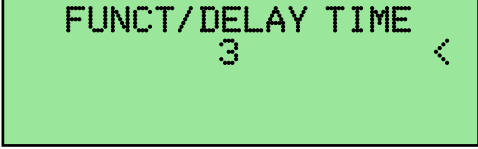

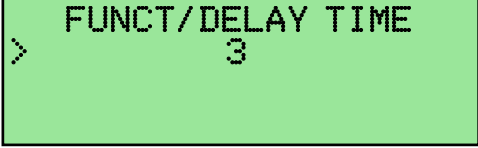

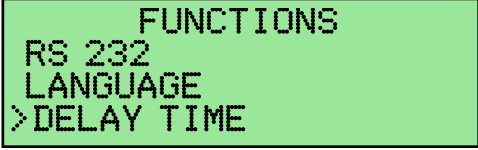
| | |
|--|---|
| <p>When powering up, the instrument displays the version of the software, then carries out an automatic reset. Once operational the instrument displays:</p> | <div style="border: 1px solid black; background-color: #90EE90; padding: 10px; text-align: center;"> <p>READY PRESS START FOR MEASUREMENT</p> </div> |
|--|---|

2. PARAMETER SETTINGS PRIOR TO USE OF THE INSTRUMENT

There are three types of parameters which can be set.







2.1. DELAY TIME












The delay time is adjustable between 1 to 10 seconds in 0.1s stages. It allows the calculation of a measurement mean value which facilitates the reading of the result.

| | | |
|---|---|--|
| To gain access to the time constant, the instrument must be in the "waiting start" mode. | |  |
| Press the FUNCTION key. |  |  |
| By using the direction arrows, place the cursor in front of the TIME DELAY function. |  |  |
| Validate with the ENTER key. |  |  |
| To modify the parameter, press again on the ENTER key. The cursor moves to the right hand side of the readout. |  |  |
| Adjust the value by using the up and down arrows on the keypad. |   |  |
| To confirm the modification, validate with ENTER . |  |  |
| To return to the main menu press CANCEL . |  |  |

2.2. SIMULATION

This function allows the display of measurements according to real atmospheric conditions or set according to predefined conditions. The predefined conditions are 20°C for the temperature and 1013 mbar for the atmospheric pressure. They can be modified.

| | | |
|---|---|---|
| <p>Still in the FUNCTION menu, place the cursor in front of SIMULATION using the keypad arrows.</p> |  | <pre>FUNCTIONS MEMOIRY BATTERY >SIMULATION</pre> |
| <p>Validate with the ENTER key. The cursor positions itself in front of STD CONDITIONS.</p> |  | <pre>FUNCT/SIMULATION >STD CONDITIONS</pre> |
| <p>Press on the ENTER key to select STD CONDITIONS. The display shows the conditions chosen previously. It may be YES or NO. (Let's suppose it is NO).</p> |  | <pre>FUNCT/SIMUL/CONDITIO >STD CONDITIONS: NO</pre> |
| <p>In this case, press on the ENTER key to modify the conditions. The cursor positions itself to the right.</p> | | <pre>FUNCT/SIMUL/CONDITIO STD CONDITIONS: NO <</pre> |
| <p>By using the up and down arrows of the keypad select YES.</p> |  | <pre>FUNCT/SIMUL/CONDITIO CONDITIONS STD: YES< PRES. : 1.013 bar TEMP. : 20.0 oC</pre> |
| <p>Validate the choice by pressing on the ENTER key.</p> |  | <pre>FUNCT/SIMUL/CONDITIO >STD CONDITIONS: YES PRES. : 1013 bar TEMP. : 20.0 oC</pre> |
| <p><u>A star now appears beside the leak measurement unit when the instrument is in cycle mode to show that the Standard conditions are on.</u></p> | | <p>Instrument in cycle mode</p> <pre>[0] : 2.000 ml/min LEAK = 0.000 ml/min* PRES. = 0.000 MPa TEMP. = 20.0°C</pre> |
| <p>Standard conditions can be modified by the user. Position the cursor in front of PRES.</p> |  | <pre>FUNCT/SIMUL/CONDITIO STD CONDITIONS: YES >PRES. : 1013 bar TEMP. : 20.0 oC</pre> |

| | | |
|---|---|--|
| <p>Press ENTER and set the atmospheric pressure value using the up and down arrows.</p> |   | <pre> FUNCT/SIMUL/CONDITIO STD CONDITIONS: YES PRES. : 1.020 bar < TEMP. : 20.0°C </pre> |
| <p>Press ENTER and position the cursor by TEMP.</p> |   | <pre> FUNCT/SIMUL/CONDITIO STD CONDITIONS: YES PRES. : 1.020 bar >TEMP. : 20.0°C </pre> |
| <p>Press ENTER and set the temperature using the up and down arrows.</p> |   | <pre> FUNCT/SIMUL/CONDITIO STD CONDITIONS: YES PRES. : 1.020 bar TEMP. : 25.0°C < </pre> |
| <p><u>Press ENTER. The instrument will now measure within the conditions predefined by the user. The star is always present in cycle mode.</u></p> |  | <pre> Instrument in cycle mode [0] : 2.000 ml/min LEAK = 0.000 ml/min* PRES. = 0.000 MPa TEMP. = 20.0°C </pre> |
| <p>To carry out the measurement in ambient atmospheric conditions, press on the ENTER key. The cursor moves to the right.</p> |  | <pre> FUNCT/SIMUL/CONDITIO STD CONDITIONS: YES< PRES. : 1.013 bar TEMP. : 20.0 °C </pre> |
| <p>Using the direction arrows, select the NO option.</p> | | <pre> FUNCT/SIMUL/CONDITIO STD CONDITIONS: NO < PRES. : 1.013 bar TEMP. : 20.0 °C </pre> |
| <p>Validate with the ENTER key.</p> |  | <pre> FUNCT/SIMUL/CONDITIO >STD CONDITIONS: NO </pre> |
| <p><u>The star in front of the leak unit disappears when the instrument is in cycle position.</u></p> | | <pre> Instrument in cycle mode [0] : 2.000 ml/min LEAK = 0.000 ml/min* PRES. = 0.000 MPa TEMP. = 20.0°C </pre> |
| <p>Press twice on the CANCEL key to return to the main functions menu.</p> |   | <pre> FUNCTIONS MEMORY BATTERY >SIMULATION </pre> |


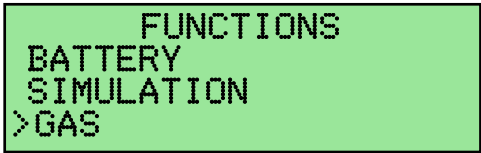

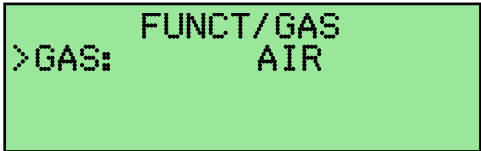



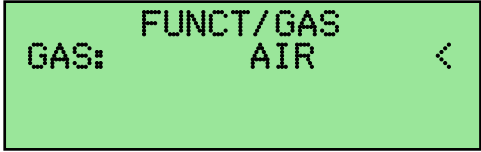

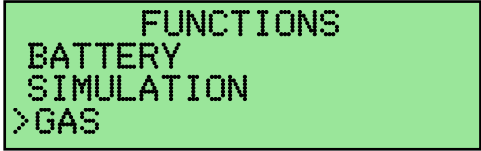
2.3. GAS

This function allows the flow measurement for a gas different than the one commonly used by the instrument (air).

The parameters available in the instrument are for the following gas:

- Air,
- Nitrogen (N₂),
- Helium,
- Other (the parameters are to be informed, consult us).



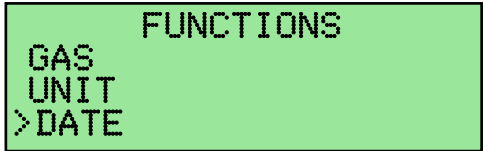

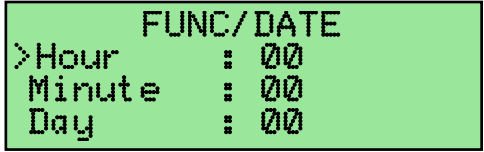

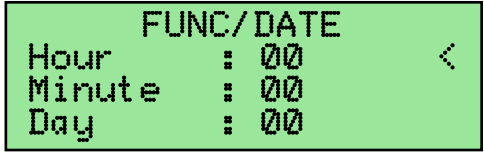


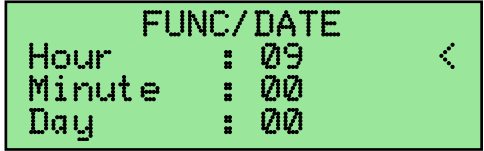


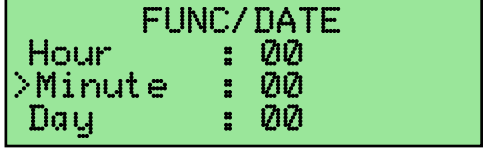

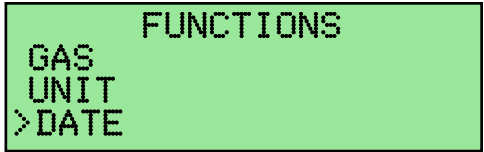
The flow full scale is varying according to the used gas:

| | | |
|---|--|--|
| <p>Still in the FUNCTION menu, place the cursor in front of GAS using the keypad arrows.</p> |  |  <pre> FUNCTIONS BATTERY SIMULATION >GAS </pre> |
| <p>Validate with the ENTER key, The cursor positions itself to the right.</p> |  |  <pre> FUNCT/GAS >GAS: AIR </pre> |
| <p>Next, choose by using the up and down arrows the type of gas among the available: air, helium, nitrogen and other then validate.</p> |    |  <pre> FUNCT/GAS GAS: AIR < </pre> |
| <p>Press the CANCEL key to return to the main functions menu.</p> |  |  <pre> FUNCTIONS BATTERY SIMULATION >GAS </pre> |

Note: the adjustment and the calibration of the instrument are established with air gas. A calibration with a specific gas can be realised on request.

2.4. DATE AND TIME

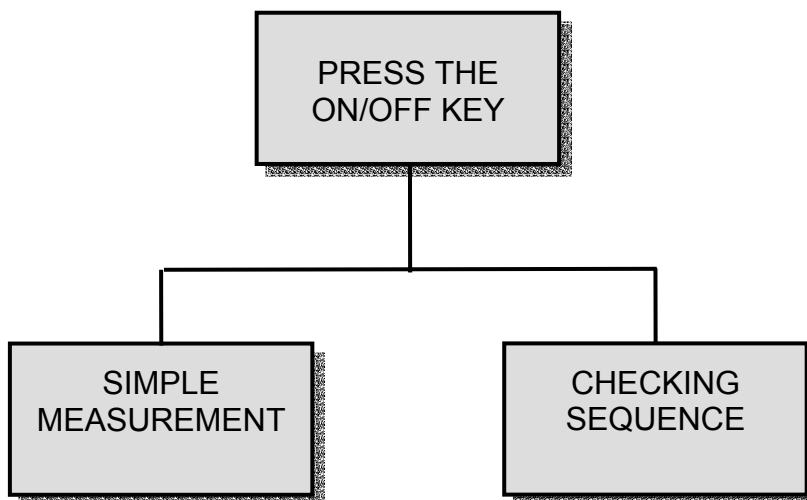
The **Leak/Flow Calibrator** possesses an internal calendar giving time and date. These parameters must be set before using the instrument.

| | | |
|---|---|--|
| Still in the FUNCTIONS menu, position the cursor in front of the DATE function. |   |  |
| Confirm using the ENTER key. The DATE function gives access to the adjustable parameters. |  |  |
| To edit the Hour parameter press on the ENTER key. The cursor should then move to the right hand side of the readout. |  |  |
| Set the hour by using the up and down arrows on the keypad. |   |  |
| Confirm using the ENTER key and move on the next parameters. Repeat the operation for the Minute, Day, Month and Year parameters. |   |  |
| To return to the main FUNCTIONS menu press the CANCEL key. |  |  |

3. MEASUREMENT MODE OPERATION PROCEDURE



The **Leak/Flow Calibrator** can carry out a simple measurement or a verification sequence with various associated options.

(Changing the units, changing the measurement ranges, storage of particular measurement points, printing of these measurements).






Note: before each measurement, it's important to make a sensor reset (auto-zero), this is to be sure of the instrument calibration compared to the atmospheric pressure.



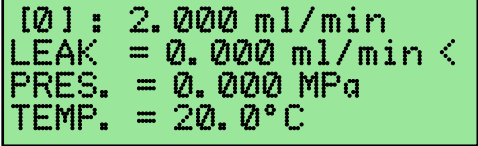

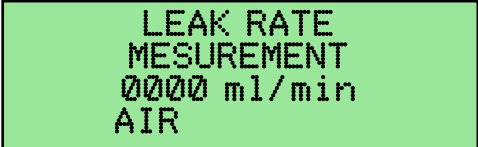
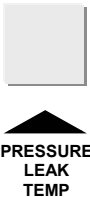
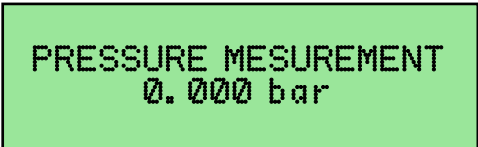
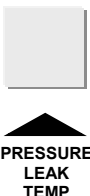
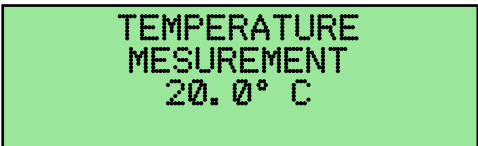
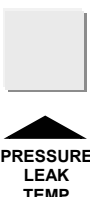
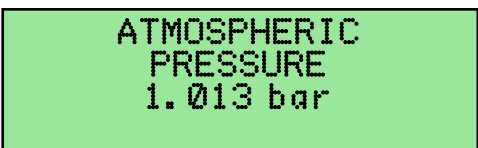
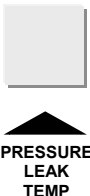
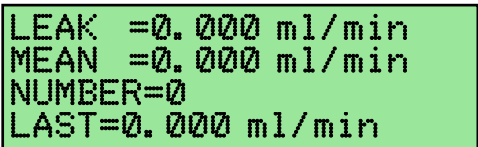
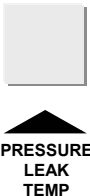
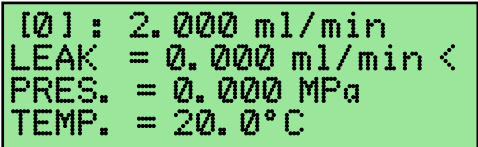
3.1. SIMPLE MEASUREMENT

| | | |
|---|---|---|
| <p>To initiate a measurement, press the START key. The first line corresponds to the number and full scale of the current range.</p> |  | <pre>[0] : 2.000 ml/min LEAK = 0.000 ml/min < PRES. = 0.000 MPa TEMP. = 20.0°C</pre> |
| <p>To end a measurement, press the RESET key.</p> |  | <pre>READY PRESS START FOR MEASUREMENT</pre> |

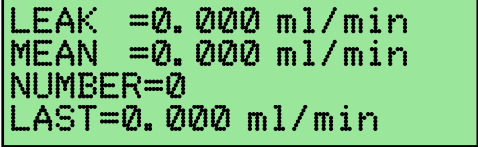

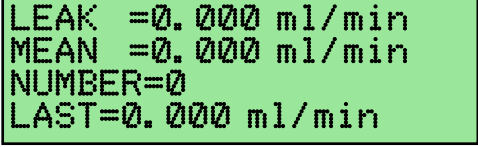

3.1.1. Range change

| | | |
|---|---|--|
| <p>When a cycle is initiated with the START key, the instrument automatically returns by default to the last range used and will carry out its measurement in that range.</p> |  | <pre>[0] : 2.000 ml/min LEAK = 0.000 ml/min < PRES. = 0.000 MPa TEMP. = 20.0°C</pre> |
| <p>To change the measurement range (in measurement mode or in waiting mode), press on the RANGES key.</p> |  | <pre>RANGE SELECTION > [0] : 2.000 ml/min [1] : 20.00 ml/min [2] : 200.0 ml/min</pre> |
| <p>The instrument offers the choice of four set measurement ranges and one automatic measurement mode. Position the cursor in front of the chosen range and validate with the ENTER key.</p> |  | <pre>RANGE SELECTION > [0] : 2.000 ml/min [1] : 20.00 ml/min [2] : 200.0 ml/min</pre> |
| <p>The readout confirms the range change.</p> | | <pre>MEASUREMENT RANGE CHANGE</pre> |

3.1.2. Display mode

| | | |
|--|---|--|
| <p>It is possible to display only one measurement at a time by pressing on the PRESSURE LEAK TEMP. key.</p> |  | |
| <p>First, press on the START key to initiate a measurement. The readout displays the three measurements simultaneously.</p> |  |  |
| <p>Press once on the PRESSURE LEAK TEMP. Key.</p> |  |  |
| <p>2nd press</p> |  |  |
| <p>3rd press</p> |  |  |
| <p>4th press</p> |  |  |
| <p>5th press The instrument offers the option of a mean measurement calculated on a number of points entered by the user.</p> |  |  |
| <p>6th press (Return to the standard display)</p> |  |  |


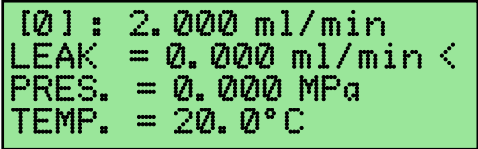

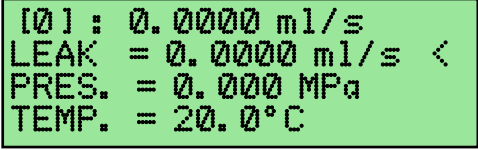

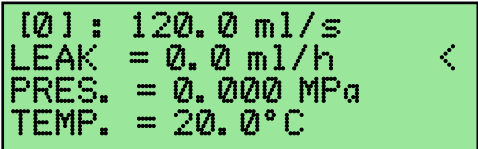

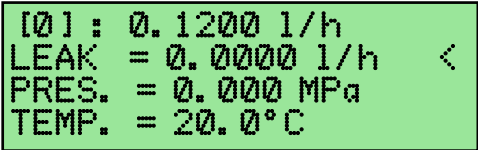

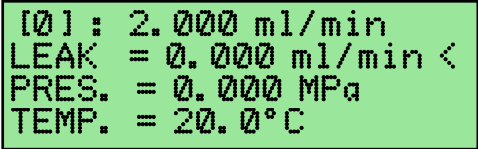
3.1.3. Average calculation and data transmission

| | | |
|--|---|---|
| <p>The instrument offers the option of a mean measurement calculated on a number of points entered by the user. The instrument displays: the current leak, the average of the measured points, the number of measured points and the value of the last measured point.</p> | |  |
| <p>To enter a measurement point, press ENTER. The instrument instantaneously calculates the average of all the points stored. The value calculated appears opposite MEAN. The number of measurement points appears opposite NUMBER. The last measurement point stored appears opposite LAST.</p> |  |  |
| <p>In this mode, the CANCEL button enables the values measured to be reset to zero.</p> |  | |


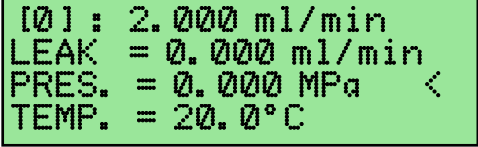
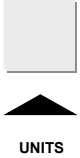
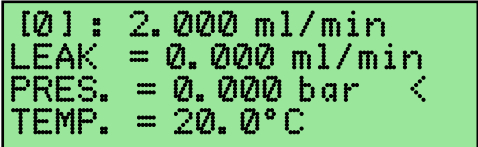
Note: at each data capture with the **ENTER** key, information displayed on the screen are transmit on the RS 232 port.

3.1.4. Unit change


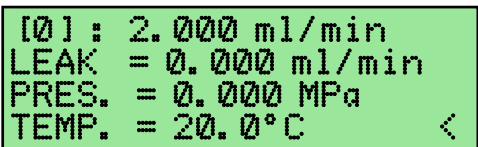
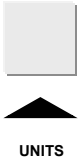
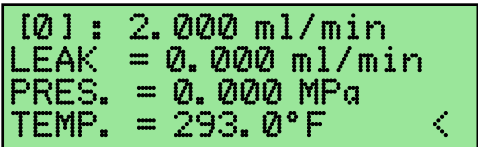
3.1.4. 1) Leak measurement unit change

| | | |
|---|--|--|
| <p>First, press the START key to initiate a measurement. The instrument returns to the last range used. To change the units, press the UNITS key.</p> |  |  |
| <p>First press the UNITS key.</p> |  <p>UNITS</p> |  |
| <p>2nd press.</p> |  <p>UNITS</p> |  |
| <p>3rd press</p> |  <p>UNITS</p> |  |
| <p>4th press. (Return to the first unit)</p> |  <p>UNITS</p> |  |



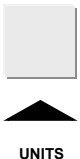
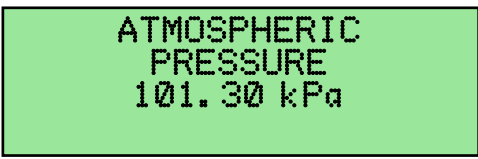
3.1.4. 2) Changing the unit of pressure measurement

| | | |
|---|---|--|
| <p>Position the cursor beside PRES.</p> |  |  |
| <p>Choose the unit required by pressing the UNITS key. The units available are bar, PSI, kPa, MPa.</p> |  |  |

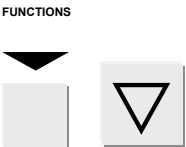
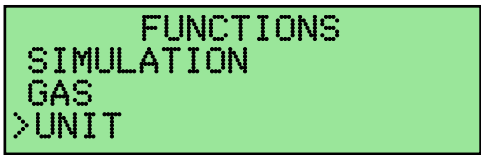

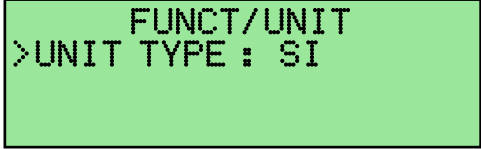

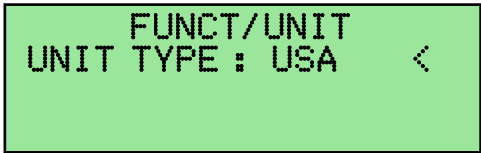

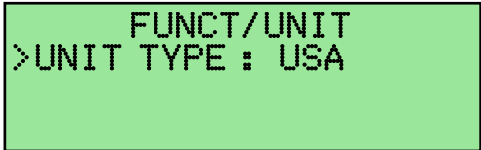

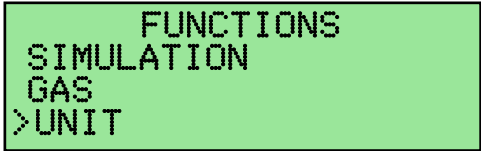
3.1.4. 3) Changing the unit of temperature measurement

| | | |
|---|--|---|
| <p>Position the cursor beside TEMP.</p> |  |  |
| <p>Choose the required unit by pressing the UNITS key. The two units available are °F or °C.</p> |  |  |


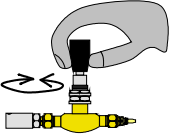


3.1.4. 4) Changing the unit of atmospheric pressure


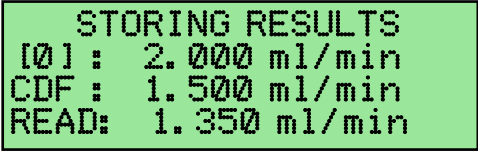



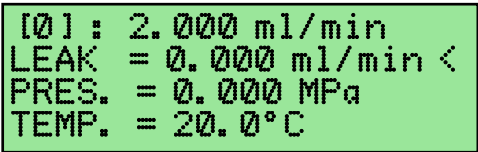
| | | |
|---|---|--|
| <p>Display the atmospheric pressure (see § 3.1.2).</p> |  |  |
| <p>Choose the required unit by pressing the UNITS key. The units available are bar, PSI, kPa, MPa.</p> |  |  |

3.1.5. Change of unit mode within the functions menu

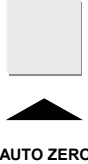

| | | |
|---|--|---|
| <p>Press the FUNCTION key and position the cursor on UNIT.</p> | <p>FUNCTIONS</p>  <p>The image shows a keypad with a 'FUNCTIONS' label above it. A downward arrow points to a square button. To its right is a square button with a downward-pointing triangle, which is highlighted with a white border, indicating the cursor is on 'UNIT'.</p> |  <p>The image shows a green screen with the following text: FUNCTIONS, SIMULATION, GAS, >UNIT. The '>UNIT' option is highlighted with a white border.</p> |
| <p>Confirm the choice by pressing the ENTER key. The UNIT function gives the choice between Standard International units and USA units.</p> |  <p>The image shows a square button with a white border and a black arrow pointing up and to the right, representing the ENTER key.</p> |  <p>The image shows a green screen with the following text: FUNCT/UNIT, >UNIT TYPE : SI. The '>UNIT TYPE : SI' option is highlighted with a white border.</p> |
| <p>To change the unit mode, press the ENTER key and then use the keypad arrows to select the appropriate mode.</p> |  <p>The image shows two square buttons side-by-side. The left one is the ENTER key (arrow pointing up-right), and the right one is a square button with a downward-pointing triangle.</p> |  <p>The image shows a green screen with the following text: FUNCT/UNIT, UNIT TYPE : USA, and a left-pointing arrow (<) to the right of 'USA'. The 'UNIT TYPE : USA' option is highlighted with a white border.</p> |
| <p>Confirm your choice by pressing the ENTER key.</p> |  <p>The image shows a square button with a white border and a black arrow pointing up and to the right, representing the ENTER key.</p> |  <p>The image shows a green screen with the following text: FUNCT/UNIT, >UNIT TYPE : USA. The '>UNIT TYPE : USA' option is highlighted with a white border.</p> |
| <p>Return to the main menu by pressing CANCEL.</p> |  <p>The image shows a square button with a white border and a black letter 'C' in the center, representing the CANCEL key.</p> |  <p>The image shows a green screen with the following text: FUNCTIONS, SIMULATION, GAS, >UNIT. The '>UNIT' option is highlighted with a white border.</p> |

3.1.6. Storing a measurement

| | | |
|--|--|---|
| <p>First, initiate a cycle by using the START key.</p> |  | <pre>[0] : 2.000 ml/min LEAK = 0.000 ml/min < PRES. = 0.000 MPa TEMP. = 20.0°C</pre> |
| <p>Adjust the leak flow value using the valve.</p> |  | <pre>[0] : 2.000 ml/min LEAK = 1500 ml/min < PRES. = 0.000 MPa TEMP. = 20.0°C</pre> |
| <p>To memorize the measurement, press the STORE key.</p> | <p>STORE</p>  | <pre>STORING RESULTS [0] : 2.000 ml/min CDF : 0.000 ml/min READ: 0.000 ml/min</pre> |
| <p>The readout shows the measurement carried out by the Leak Flow Calibrator opposite CDF. The measurement carried out by the instrument connected to the Leak Flow Calibrator appears opposite READ and must be adjusted manually using the buttons on the keyboard. As default, the value displayed is equal to that read by the Leak Flow Calibrator</p> | | <pre>STORING RESULTS [0] : 2.000 ml/min CDF : 1.500 ml/min READ: 1.500 ml/min</pre> |
| <p><u>It is now possible to use the save button for two different operations:</u> <u>1st) to record the measurement from the Leak Flow Calibrator,</u> <u>2nd) to store the value read by the instrument connected to the CDF.</u></p> | | |
| <p>1st) To record the measurement carried out by the CDF, press the STORE button again.</p> | <p>MEMOIRE</p>  | <pre>STORING RESULTS [0] : 2.000 ml/min CDF : 0.000 ml/min READ: 0.000 ml/min</pre> |

| | | |
|---|---|--|
| <p>2nd) To adjust the measurement carried out by the instrument connected to the Leak Flow Calibrator use the arrow buttons on the keyboard.</p> |  |  |
| <p>To confirm the saving of the measurement, press ENTER.</p> |  |  |
| <p>To cancel the storage operation, press the CANCEL key.</p> |  |  |

3.1.7. Auto-Zero

| | | |
|---|--|--|
| <p>The auto-zero allows the adjustment of the natural deviation of the sensor signals. Press the auto-zero key.</p> |  <p>AUTO ZERO</p> |  |
|---|--|--|

3.2. VERIFICATION SEQUENCE

A verification sequence allows the operator to program a set of measurement points as a guide for the person in charge of checking the test instrument.


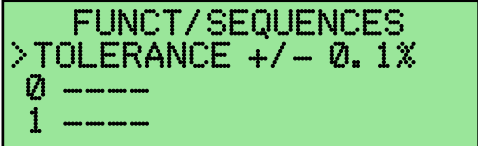

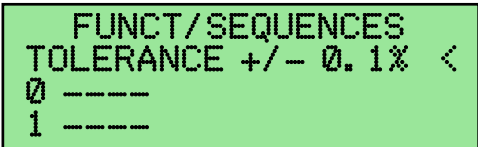


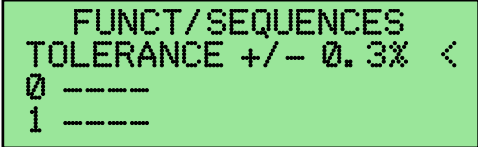

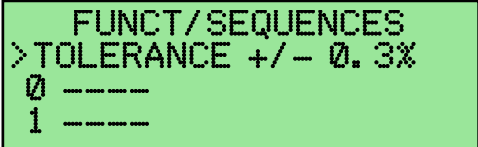
If the difference between the value measured by the **Leak/Flow calibrator** and the value measured by the instrument is greater than the programmed accuracy the sequence will be declared NOK (bad). Otherwise, it will be accepted.

If the difference between the value measured by the **Leak/Flow Calibrator** and the instruction value is larger than 20 %, an error message is displayed.







The values collected in this way are stored in the memory with the date of the measurement.

3.2.1. Programming


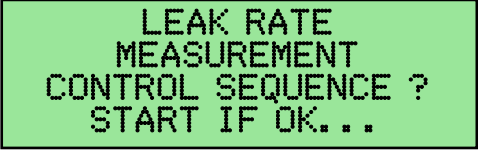

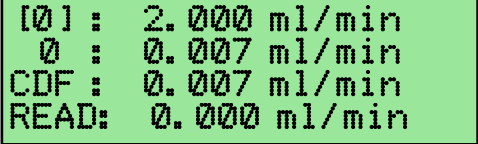
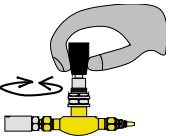
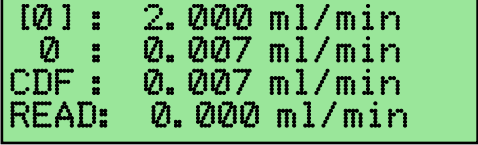


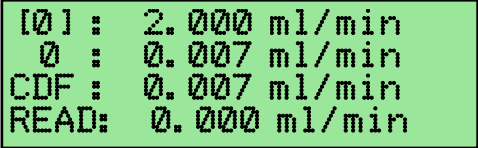

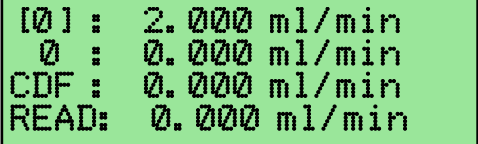
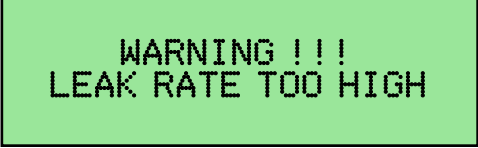
3.2.1. 1) Accuracy of the sequence


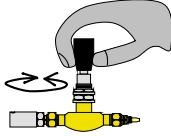

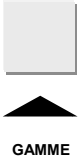


| | | |
|---|---|--|
| In the FUNCTIONS menu, confirm the SEQUENCES function with the ENTER key. |  |  |
| To choose the accuracy of the sequences, validate the accuracy parameter with the ENTER key. The cursor moves to the right hand side of the readout. |  |  |
| Set the accuracy by using the up and down arrows on the keypad. |   |  |
| Validate with ENTER . |  |  |


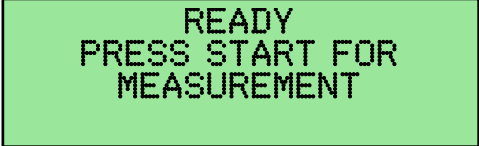
3.2.1. 2) Storage of the measurement points

| | | |
|--|---|--|
| <p>To store a measurement for a point in time, place the cursor in front of the first point using the keypad arrows.</p> |  | <pre> FUNCT/SEQUENCES TOLERANCE +/- 0.3% >0 ---- 1 ---- </pre> |
| <p>Validate with the ENTER key. The cursor moves to the right hand side of the readout.</p> |  | <pre> FUNCT/SEQUENCES TOLERANCE +/- 0.3% 0 ---- < 1 ---- </pre> |
| <p>Adjust the value by using the up and down arrows of the keypad.</p> |  | <pre> FUNCT/SEQUENCES TOLERANCE +/- 0.3% 0 0.007 ml/min < 1 ---- </pre> |
| <p>Once the point is stored, validate with the ENTER key.</p> |  | <pre> FUNCT/SEQUENCES TOLERANCE +/- 0.3% >0 0.007 ml/min 1 ---- </pre> |
| <p>Move on to the next point by positioning the cursor in front of it. Continue the same procedure as that described above to enter the value. The Leak/ Flow Calibrator can store 10 measurement points.</p> |  | <pre> FUNCT/SEQUENCES TOLERANCE +/- 0.3% 0 0.007 ml/min >1 ---- </pre> |
| <p>Once they are all stored in the memory, press the CANCEL key to exit.</p> |  | <pre> FUNCTIONS >SEQUENCES MEMORY BATTERY </pre> |

3.3. INITIATING THE SEQUENCE

| | | |
|---|---|--|
| <p>To initiate the sequence, press the CHECKING SEQUENCE key.</p> | <p>SEQUENCE DE VERIFICATION</p>  |  |
| <p>Press the START key to confirm.</p> |  |  |
| <p>Adjust the leak flow with the valve to bring it up to the value of the stored target point.</p> |  |  |
| <p>The first line corresponds to the range of measurement. (The instrument automatically selects the most appropriate range of measurement for the target point.) The second line corresponds to the target point. The value measured by the Leak Flow Calibrator is displayed directly opposite CDF on the third line. The value measured by the instrument connected to the Leak Flow Calibrator must be entered manually using the arrows on the keyboard. It is displayed opposite READ on the fourth line.</p> |   |  |
| <p>To move on to the following point, press ENTER.</p> |  |  |
| <p>If the leak flow generated is greater than the range in progress, a warning message is displayed and the instrument goes into wait mode.</p> | |  |

| | | |
|---|---|--|
| <p>To restart the sequence, press on START.</p> |  | <pre>[0] : 2.000 ml/min 0 : 0.000 ml/min CDF : 0.000 ml/min READ: 0.000 ml/min</pre> |
| <p>Adjust the valve again.</p> |  | |
| <p>To quit the sequence, press RESET.</p> |  | <pre>READY PRESS START FOR MEASUREMENT</pre> |
| <p>It is possible to change the range during the carrying out of a sequence. To do this, press on the RANGE key.</p> |  | <pre>[0] : 2.000 ml/min 0 : 0.000 ml/min CDF : 0.000 ml/min READ: 0.000 ml/min</pre> |
| <p>The available ranges are displayed on the readout.</p> | | <pre>RANGE SELECTION > [0] : 2.000 ml/min [1] : 20.00 ml/min [2] : 200.0 ml/min</pre> |
| <p>Select the appropriate range with the keypad arrows.</p> |  | <pre>RANGE SELECTION [0] : 2.000 ml/min > [1] : 20.00 ml/min [2] : 200.0 ml/min</pre> |
| <p>Validate your choice by pressing on the ENTER key.</p> |  | <pre>MEASUREMENT RANGE CHANGE</pre> |
| <p>The sequence restarts with the new range.</p> | | <pre>[1] : 20.00 ml/min 0 : 0.000 ml/min CDF : 0.000 ml/min READ: 0.000 ml/min</pre> |
| <p>Once the last measurement point has been confirmed, the Leak/Flow Calibrator gives the sequence result and specifies if it is OK...</p> | | <pre>SEQUENCE OK PUSH RESET TO CONTINUE...</pre> |
| <p>... Or NOK</p> | | <pre>SEQUENCE NOK PUSH RESET TO CONTINUE</pre> |



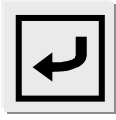
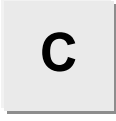
| | | |
|--|---|--|
| <p>Press the CANCEL key to return to the START WAITING mode.</p> |  |  |
|--|---|--|

Chapter 4

PRACTICALITIES OF THE LEAK/FLOW CALIBRATOR

1. NAVIGATION DETAILS

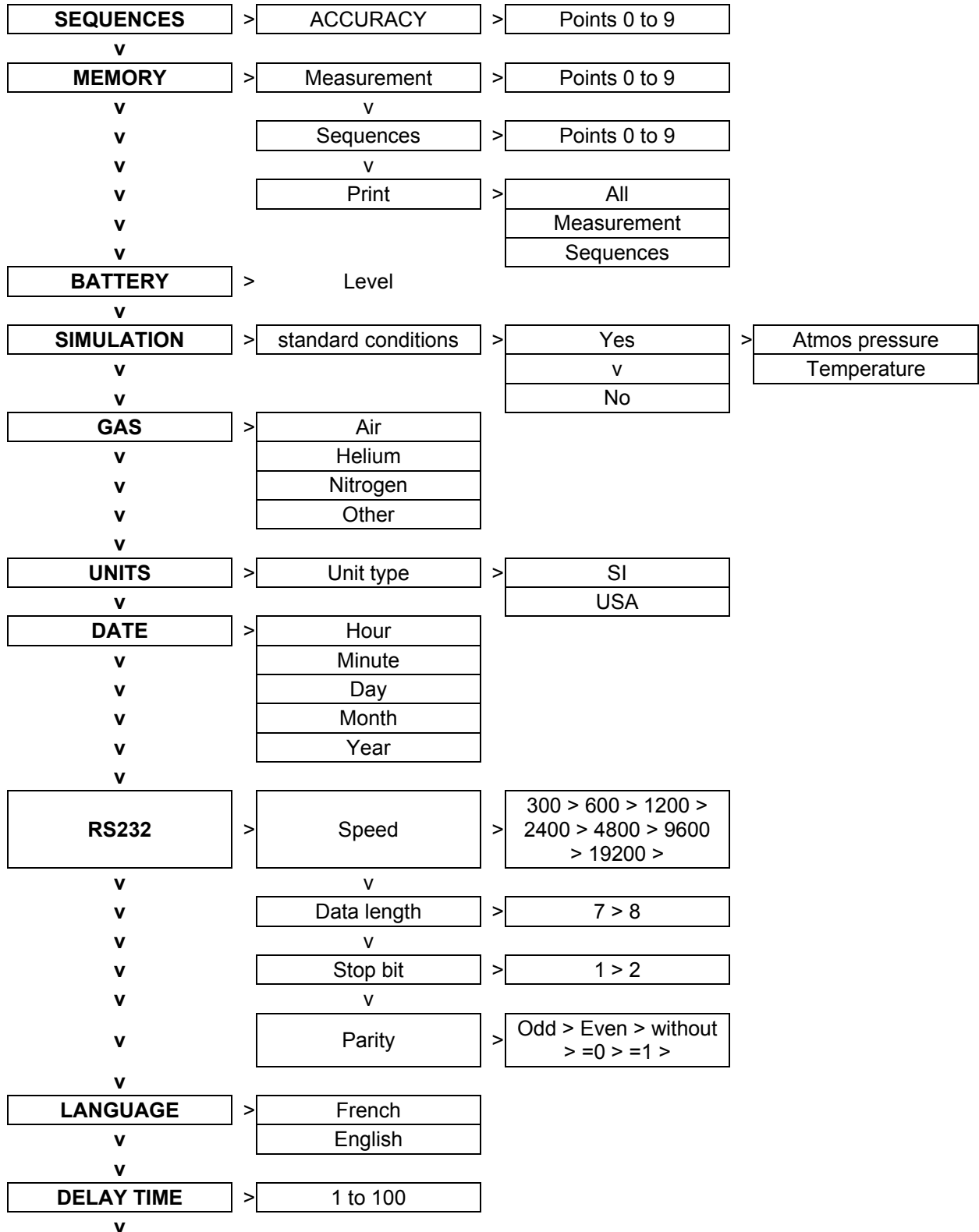
1.1. HOW TO MOVE IN A MENU

| | | |
|--|-------------------|--|
|   | Direction arrows | Moves the cursor in the readout display. |
|  | ENTER key | Allows the user to enter a menu and adjust and validate a parameter or function. |
|  | CANCEL key | Allows the user to exit a menu. |

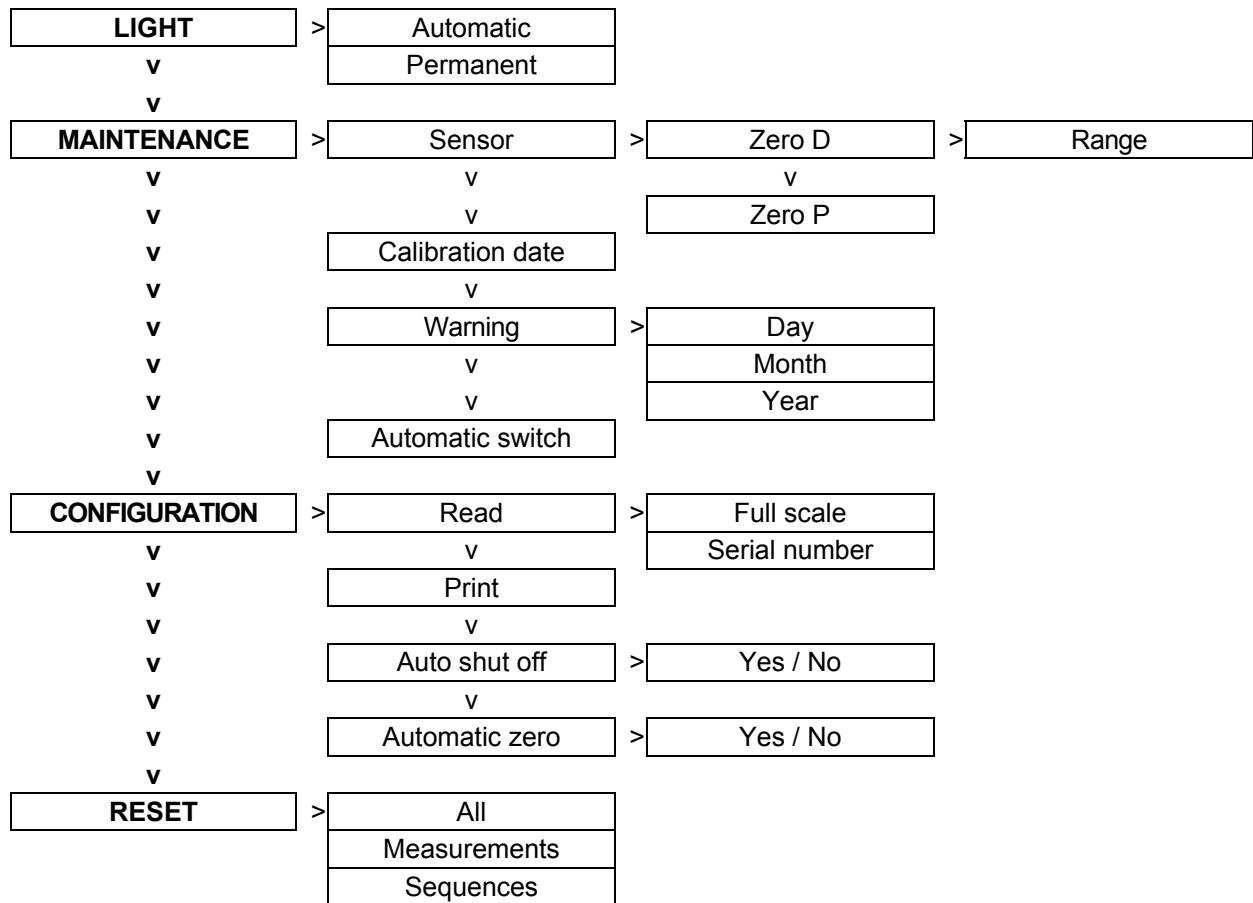
1.2. FUNCTION KEY MENU NAVIGATION DETAILS

Pressing on the **FUNCTION** key will display a menu on the readout. Each sub-menu gives access to functions and parameters.


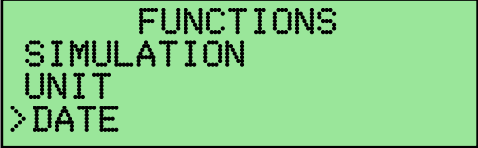

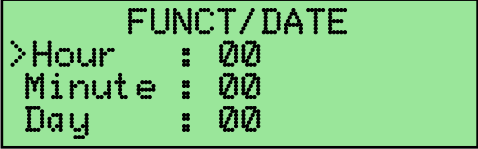

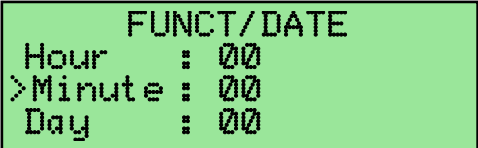

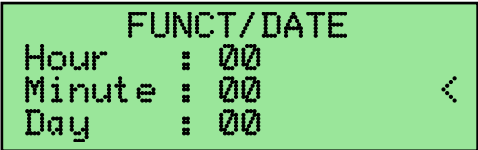

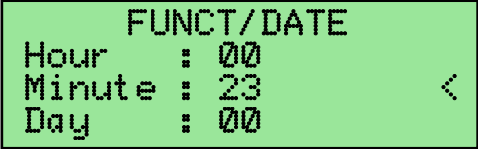

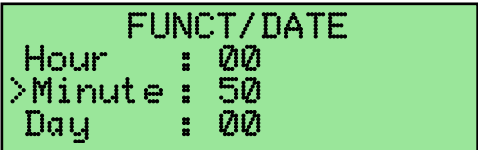

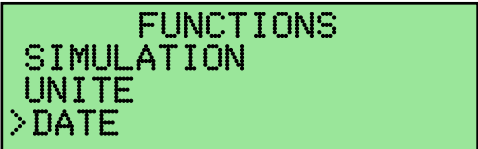
1.2.1. Flow chart



Chapter 4 - Practicalities of the Leak/Flow Calibrator



2. MODIFICATION OF A PARAMETER

| | | |
|--|---|--|
| <p>Access to the parameters located in a function is gained by first placing the cursor in front of it and then by validating your choice with the ENTER key. For example, using the DATE function.</p> |  |  |
| <p>Pressing the DATE function causes the following parameters to appear :</p> <ul style="list-style-type: none"> ⇒ hour, ⇒ minute, ⇒ day, ⇒ month, ⇒ year. <p>To visualise all the parameters, use the up and down arrows.</p> | <p>FUNCTION</p>  |  |
| <p>To modify a parameter, such as the Minute parameter, position the cursor in front of it.</p> |  |  |
| <p>To edit this parameter press on the ENTER key. The cursor will then move to the right hand side of the readout.</p> |  |  |
| <p>The minutes may now be adjusted by using the up and down keys of the keypad.</p> |  |  |
| <p>Once the parameter is modified, validate it by pressing on the ENTER key. The cursor then returns to the left hand side of the readout.</p> |  |  |
| <p>To return to the previous menu press the CANCEL key.</p> |  |  |

3. PRACTICALITIES OF THE INSTRUMENT


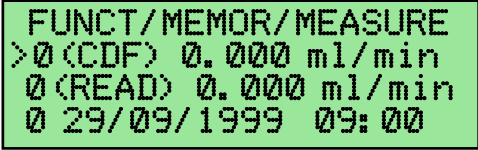



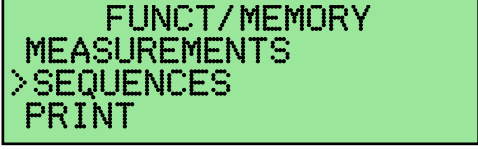

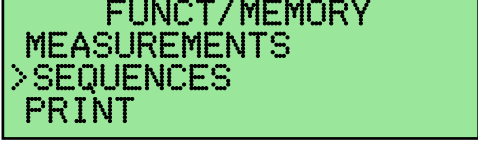
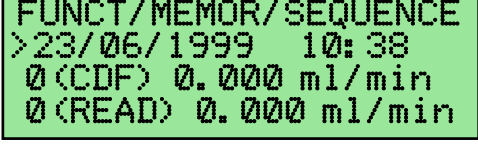

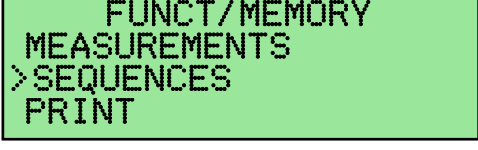

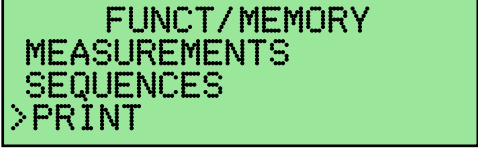

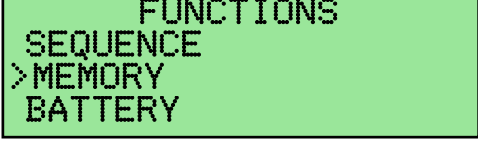
| | | |
|---|-----------------|--|
| To gain access to the settings, the instrument must be in waiting start mode. | | |
| Press the FUNCTION key. | <p>FUNCTION</p> | |

3.1. SEQUENCES FUNCTION




| | | |
|---|--|--|
| Place the cursor in front of the SEQUENCES function by using the up and down arrows. To access its menu press on the ENTER key. | | |
| <p><u>To set accuracy and measurement points for the sequence, see chapter 3 § 3.2.1</u></p> | | |
| To quit this function and return to the main menu, press the CANCEL key. | | |

3.2. MEMORY FUNCTION



| | | |
|--|--|--|
| Next, select the MEMORY function and confirm by pressing the ENTER key. | | |
| The MEMORY function contains a sub menu. | | |
| To enter the MEASUREMENTS function, place the cursor in front of it and press on ENTER . | | |

| | | |
|--|---|--|
| <p>The stored measurements are then displayed on the readout.</p> <p>The ATEQ Leak/Flow Calibrator can store up to 10 measurements. To scroll through the stored measurements, use the up and down keypad arrows.</p> |  |  |
| <p>To exit this function, press on the CANCEL key.</p> |  |  |
| <p>Next, select the SEQUENCES function by placing the cursor in front it by using the up and down keypad arrows.</p> |  |  |
| <p>Confirm the choice with the ENTER key.</p> |  |  |
| <p>The stored measurement points appear on the readout.</p> <p>The ATEQ Leak/Flow Calibrator can memorise up to 10 measurement points.</p> | |  |
| <p>To exit and return to the previous menu press CANCEL.</p> |  |  |
| <p>Next, select the PRINT function and press ENTER.</p> |  |  |
| <p><u>For how to print results, see chapter 4.1.</u></p> | | |
| <p>Press twice on CANCEL to return to the main functions menu.</p> |  |  |



3.3. BATTERY FUNCTION


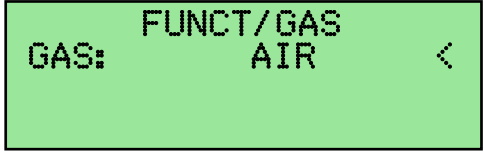

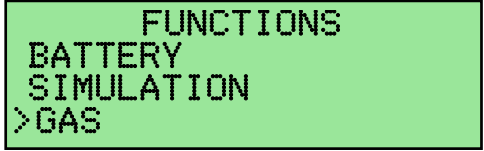
| | | |
|--|---|--|
| <p>Select the BATTERY function by using the up and down arrows of the keypad.</p> |  | <pre>FUNCTIONS SEQUENCE MEMORY >BATTERY</pre> |
| <p>Validate the choice by pressing on the ENTER key. The battery power level appears.</p> |  | <pre>FUNCT/BATTERY LEVEL : 80%</pre> |
| <p>Return to the main FUNCTIONS menu by pressing on the CANCEL key.</p> |  | <pre>FUNCTIONS SEQUENCE MEMORY >BATTERY</pre> |

3.4. SIMULATION FUNCTION


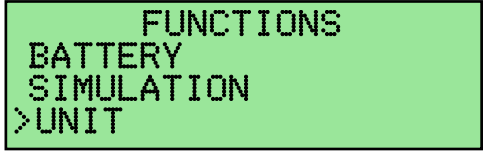
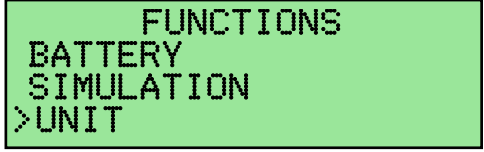

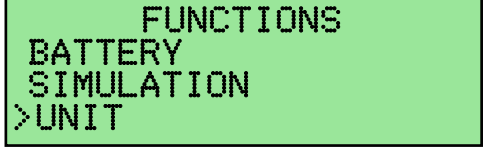
| | | |
|---|---|--|
| <p>Select SIMULATION function by using the up and down arrows of the keypad.</p> |  | <pre>FUNCTIONS MEMORY BATTERY >SIMULATION</pre> |
| <p><u>For adjustments in the SIMULATION function, refer to chapter 3 § 2.2.</u></p> | | <pre>FUNCTIONS MEMORY BATTERY >SIMULATION</pre> |
| <p>Return to the main FUNCTIONS menu by pressing on the CANCEL key.</p> |  | <pre>FUNCTIONS MEMORY BATTERY >SIMULATION</pre> |

3.5. GAS FUNCTION


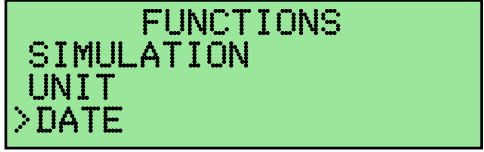
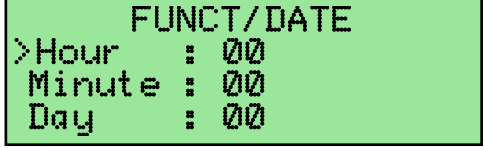

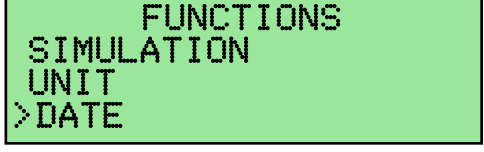
| | | |
|--|---|---|
| <p>Select GAS function by using the up and down arrows of the keypad.</p> |  | <pre>FUNCTIONS BATTERY SIMULATION >GAS</pre> |
| <p>Validate with the ENTER key the cursor goes to the right of the display.</p> |  | <pre>>GAS: FUNCT/GAS AIR</pre> |

| | | |
|---|---|--|
| <p>Next, select with the up and down arrows the type of gas used for the measurements. Choice among: air, helium, nitrogen and "other".</p> |  |  |
| <p>Return to the main FUNCTIONS menu by pressing on the CANCEL key.</p> |  |  |


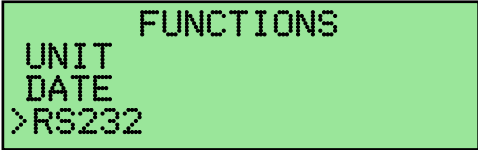

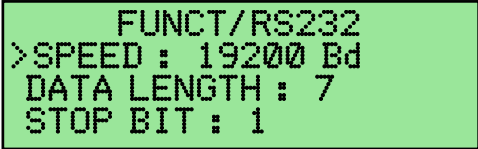

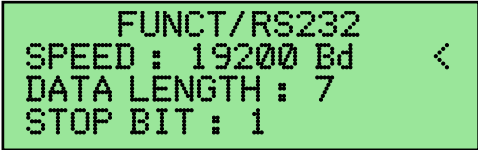


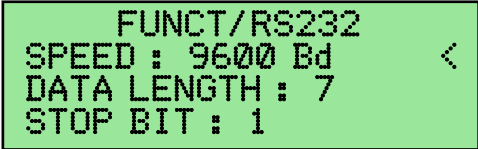

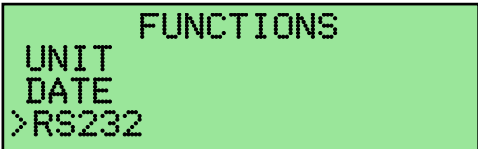
3.6. UNIT FUNCTION

| | | |
|--|---|--|
| <p>Next, select the UNIT function by using the up and down keypad arrows.</p> |  |  |
| <p><u>For adjustments in the UNIT function, refer to chapter 3 § 3.1.4.</u></p> | |  |
| <p>To return to the main functions menu, press on the CANCEL key.</p> |  |  |



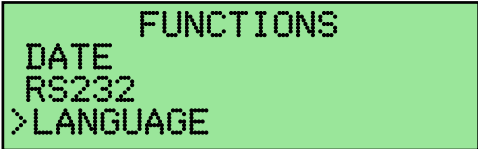



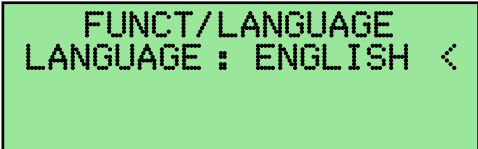
3.7. DATE FUNCTION



| | | |
|--|---|--|
| <p>Next, select the DATE function by using the up and down keypad arrows.</p> |  |  |
| <p><u>To adjust the internal calendar, refer to chapter 3 § 2.4.</u></p> | |  |
| <p>Once all the parameters are adjusted, exit the DATE function by pressing on the CANCEL key. .</p> |  |  |

3.8. RS232 FUNCTION



| | | |
|---|---|--|
| Place the cursor in front of RS232 function with the up and down keypad arrows. |  |  |
| Confirm the choice by pressing on the ENTER key. |  |  |
| To edit the SPEED parameter press on the ENTER key. |  |  |
| Select the appropriate speed by using the up and down keypad arrows and confirm it with the ENTER key. |   |  |
| <u>Set the other parameters using the same method.</u> | | |
| Press on CANCEL to return to the main functions menu. |  |  |

3.9. LANGUAGE FUNCTION





| | | |
|---|---|--|
| Next, select the LANGUAGE function with the arrow keys and validate the choice with the ENTER key. |   |  |
| The LANGUAGE function allows the operator to choose the readout language. To edit the LANGUAGE press on the ENTER key. |  |  |
| The cursor moves to the right hand side of the readout. To choose the appropriate language, use the keypad arrows. |  |  |

| | | |
|---|---|--|
| Confirm the choice by pressing the ENTER key. |  | <pre> FUNCT/LANGUAGE >LANGUAGE : ENGLISH </pre> |
| Press the CANCEL key to return to the main functions menu. |  | <pre> FUNCTIONS DATE RS232 >LANGUAGE </pre> |













3.10. DELAY TIME FUNCTION

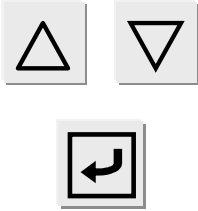
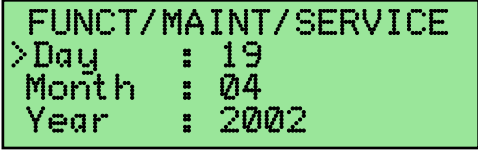

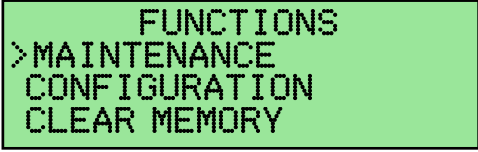
| | | |
|---|--|--|
| Place the cursor in front of the DELAY TIME function by using the keypad arrows. |  | <pre> FUNCTIONS RS232 LANGUAGE >DELAY TIME </pre> |
| <u>To set the DELAY TIME, refer to chapter 3 § 2.1.</u> | | |
| Press the CANCEL key to return to the main functions menu. |  | <pre> FUNCTIONS RS232 LANGUAGE >DELAY TIME </pre> |

3.11. LIGHTING FUNCTION (BACKLIGHT DISPLAY)

| | | |
|---|---|---|
| Next, select the BACK LIGHT function by positioning the cursor with the up and down arrows. |  | <pre> FUNCTIONS LANGUAGE DELAY TIME >BACK LIGHT </pre> |
| Validate with the ENTER key. Choose the type of backlight of the display: continue , for a continued lighting of the display or auto , for lighting the display during 5 minutes after pressing the  key. |  | <pre> FUNCT/LIGHT >BACK LIGHT: AUTO. </pre> |
| Press the CANCEL key to return to the main functions menu. |  | <pre> FUNCTIONS LANGUAGE DELAY TIME >BACK LIGHT </pre> |







3.12. MAINTENANCE FUNCTION




| | | |
|--|---|--|
| Next, select the MAINTENANCE function and confirm the choice with the ENTER key. |   | <pre>FUNCTIONS LANGUAGE DELAY TIME >MAINTENANCE</pre> |
| To edit the SENSOR function parameters select it and press on the ENTER key. |  | <pre>FUNCT/MAINTENANCE >SENSOR CALIBRATION DATE SERVICE DATE</pre> |
| The characteristics of the sensor are then displayed on the readout. | | <pre>FUNCT/MAINT/SENSOR >ZERO D : RANGE [0] : 2315 ZERO P : 4095</pre> |
| It is possible to select the sensor characteristic for each range. To do this, press on the ENTER key and choose the required range by using the keypad arrows. |   | <pre>FUNCT/MAINT/SENSOR ZERO D : RANGE [2] < : 1989 ZERO P : 4095</pre> |
| Confirm with the ENTER key. |  | <pre>FUNCT/MAINT/SENSOR >ZERO D : RANGE [2] : 1989 ZERO P : 4095</pre> |
| To exit the function, press on the CANCEL key. |  | <pre>FUNCT/MAINTENANCE >SENSOR CALIBRATION DATE SERVICE DATE</pre> |
| Next, place the cursor in front of the CALIBRATION DATE function and confirm the choice by pressing on the ENTER key. |   | <pre>FUNCT/MAINTENANCE SENSOR >CALIBRATION DATE SERVICE DATE</pre> |
| The calibration date is displayed. |  | <pre>FUNCT/MAINT/CALIBRAT ATEQ Calibration on : 06/08/99</pre> |
| Next, place the cursor in front of the SERVICE DATE function and confirm the choice by pressing on the ENTER key. |   | <pre>FUNCT/MAINTENANCE SENSOR CALIBRATION DATE >SERVICE DATE</pre> |

| | | |
|---|---|--|
| <p>It's now possible to change the warning date that the next calibration of the instrument is necessary.</p> <p>To do this, select the date parameter to be changed, press on the ENTER key and modify to the required value by using the keypad arrows, and confirm the value by pressing on the ENTER key.</p> |  |  |
| <p>Press twice on the CANCEL key to return to the main functions menu.</p> |  |  |










Note: The "**MAINTENANCE/SWITCH AUTO.**" is a function for the ATEQ factory, it serves to make a running in of the instrument. This function is not used in normal functioning.

3.13. CONFIGURATION FUNCTION

| | | |
|---|---|---|
| Next, place the cursor in front of the CONFIGURATION function and confirm with the ENTER key. |  | <pre>FUNCTIONS MAINTENANCE >CONFIGURATION RESET</pre> |
| The CONFIGURATION function sub menu is displayed in the readout. | | <pre>FUNCT/CONFIGURATION >READ PRINT AUTO SHUT OF : NO</pre> |
| To edit the READ function, select it with the arrows and press ENTER . The instrument will then display its full scale and serial number. |  | <pre>FUNCT/CONF/READ F. SCALE : 11000.000 SERIAL NUM : No 003</pre> |
| Press CANCEL to return to the CONFIGURATION menu. Use the keypad arrows to select PRINT . |  | <pre>FUNCT/CONFIGURATION READ >PRINT AUTO SHUT OF : NO</pre> |
| Confirm the choice by pressing on the ENTER key. This will activate the printing of the configuration parameters. |  | <pre>FUNCT/CONFIGURATION READ >PRINT AUTO SHUT OF : NO</pre> |
| The readout displays a printing confirmation message. . | | <pre>PRINTING CONFIGURATION...</pre> |
| Then place the cursor in front of AUTO SHUT OFF . This function enables activation or deactivation of automatic standby mode for the instrument after 30 minutes. Confirm by pressing ENTER . |  | <pre>FUNCT/CONFIGURATION READ PRINT AUTO SHUT OF : NO <</pre> |
| Select YES or NO using the direction buttons. Confirm by pressing ENTER . |  | <pre>FUNCT/CONFIGURATION READ PRINT >AUTO SHUT OF : YES</pre> |


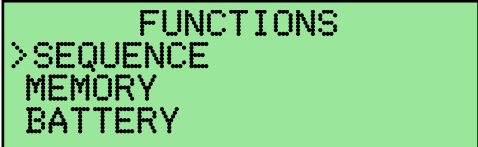

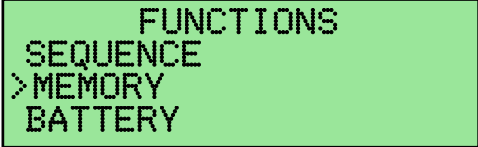

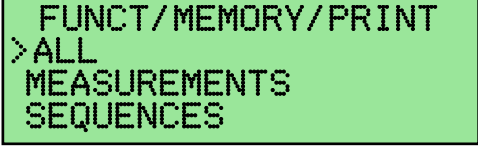

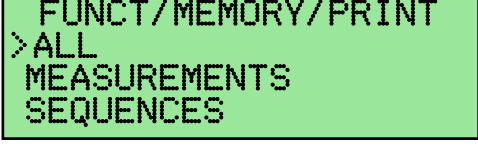




| | | |
|---|---|---|
| Then place the cursor in front of AUTO ZERO . |   | <pre>FUNCT/CONFIGURATION PRINT AUTO SHUT OF : YES >AUTO ZERO : YES</pre> |
| This function, when is validate by "YES" allows to realise automatically every ten minutes an automatic zero. | | |
| To return to the main FUNCTIONS menu, press on the CANCEL key. |  | <pre>FUNCTIONS DELAY TIME MAINTENANCE >CONFIGURATION</pre> |

3.14. RESET FUNCTION

| | | |
|--|---|--|
| Select the RESET function with the cursor by using the keypad arrows. |  | <pre>FUNCTIONS MAINTENANCE CONFIGURATION >RESET</pre> |
| Enter the choice by pressing the ENTER key. The RESET menu will then be displayed. |  | <pre>FUNCT/RESET >ALL MEASUREMENTS SEQUENCES</pre> |
| To reset the measurements and the sequences select ALL and confirm by pressing ENTER . |  | <pre>FUNCT/RESET >ALL MEASUREMENTS SEQUENCES</pre> |
| To reset the measurements only select MEASUREMENTS and validate by pressing on ENTER . |   | <pre>FUNCT/RESET ALL >MEASUREMENTS SEQUENCES</pre> |
| To reset the sequences only select SEQUENCES and validate by pressing on ENTER . |   | <pre>FUNCT/RESET ALL MEASUREMENTS >SEQUENCES</pre> |
| To return to the main FUNCTIONS menu, press on the CANCEL key. |  | <pre>FUNCTIONS MAINTENANCE CONFIGURATION >RESET</pre> |
| To exit the FUNCTIONS menu, press again on CANCEL . |  | <pre>READY PRESS START FOR MEASUREMENT</pre> |

4. PRINTING THE RESULTS

4.1. PRINT RESULTS PROCEDURE

| | | |
|--|---|--|
| <p>Press the FUNCTIONS key.</p> | <p>FUNCTION</p>  |  |
| <p>In the FUNCTIONS menu, select MEMORY with the keypad arrows and confirm with the ENTER key.</p> |  |  |
| <p>Select PRINT by using the keypad arrow keys and confirm with the ENTER key.</p> |  |  |
| <p>Confirm the ALL option in the print menu with the ENTER key.</p> |  |  |
| <p>First, the instrument prints the sequences...</p> | |  |
| <p>...then, the measurements.</p> | |  |
| <p>To print the measurements only or the sequences only, place the cursor in front of MEASUREMENTS and enter the choice by pressing the ENTER key.</p> |  |  |

4.2. MEASUREMENT RESULTS INFORMATION FRAME

The results frame has 40 columns.

Example:

```
PRINT MEASUREMENT :
[11000] : 04/11/1999 15 : 54
[11001] : CDF VALUE : 238 ml/min
[11002] : VALUE READ : 238 ml/min
[11003] : PRESSURE : 0.000 bar

[11010] : 04/11/1999 15 : 54
[11011] : CDF VALUE : 12.3 ml/min
[11012] : VALUE READ : 12.3 ml/min
[11013] : PRESSURE : 0.000 bar
```

4.3. SEQUENCE RESULTS INFORMATION FRAME

The results frame has 40 columns

Example:

```
PRINT SEQUENCE :
[2110a] : ACCURACY : + /- 3.0%
[2110b] : SEQUENCE OK : 0
[2110c] : 04/11/1999 15 : 52

[21101] : CDF VALUE : 0.999 ml/min OK
[21102] : VALUE READ : 0.997 ml/min
[21103] : PRESSURE : 0.000 bar

[21111] : CDF VALUE : 3.23 ml/min OK
[21112] : VALUE READ : 3.23 ml/min
[21113] : PRESSURE : 0.000 bar
```

4.4. RESULTS FROM FOR THE MEAN MEASUREMENT

The results frame for the mean measurement has 40 columns.

Example:

```
[31011] : 04/04/2000 15:37
[31012] : LEAK= 0.1 ml/h
[31013] : MEAN= 0.1ml/h
[31014] : NUMBER=1
[31015] : LAST.= 0.1 ml/h

[31021] : 04/04/2000 15:37
[31022] : LEAK= 0.2 ml/h
[31023] : MEAN= 0.1 ml/h
[31024] : NUMBER=2
[31025] : LAST.= 0.1 ml/h
```

4.5. NUMERIC CODE EXPLANATION

[| A | B | C | D | E |]

| MEASUREMENTS | |
|-----------------------------|-----------------------|
| Simple measurement | A=1 |
| Leak measurement | B=1 |
| Number of measurement point | C and D = 00 to 09 |
| CDF value | E=1 |
| Value READ | E=2 |
| Pressure value | E=3 |

| CHECKING SEQUENCE | |
|-----------------------|----------|
| Sequence | A=2 |
| Leak measurement | B=1 |
| Number of sequence | C=0 to 9 |
| Point in sequence | D=0 to 9 |
| Accuracy | E=a |
| Pass or Fail sequence | E=b |
| Date | E=c |
| CDF value | E=1 |
| Value READ | E=2 |
| Pressure value | E=3 |

| MEAN MEASUREMENT | |
|-----------------------------|-----------------------|
| Mean measurement | A=3 |
| Leak measurement | B=1 |
| Number of measurement point | C and D = 00 to 99 |
| Date | E=1 |
| CDF value | E=2 |
| Mean value | E=3 |
| Number of points stored | E=4 |
| Value of last point | E=5 |

4.6. CONFIGURATION RESULTS INFORMATION FRAME

The configuration frame has 40 columns.

```

*****
*           LEAK FLOW CALIBRATOR   *
*           V 1.5                   *
*****
Serial num : 1630019

ATEQ calibration on : 29/10/1999

LANGUAGE :  FRANÇAIS
           ENGLISH

Full scale PRESSURE : 11 bar; ZERO : 4095

Full scale [0] : 2.000 ml/min ; ZERO : 1805
Full scale [1] : 20.00 ml/min ; ZERO : 1995
Full scale [2] : 200.00 ml/min ; ZERO : 1816
Full scale [3] : 2000 ml/min ; ZERO : 1994
Full scale [4] : 20000 ml/min ; ZERO : 2440

DELAY TIME : 10

USER CONDITIONS
TEMP : 20.0 oC
ATMOSPHERIC PRESSURE : 1.013 bar
    
```

Chapter 5

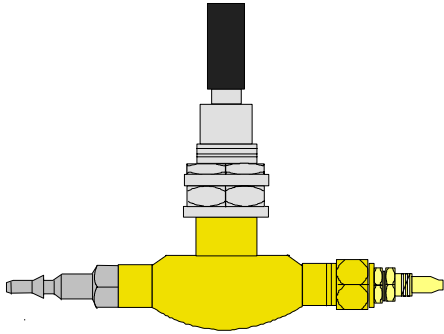
ACCESSORIES

1. NEEDLE VALVE

Needle valves are used to set the leak measurement.

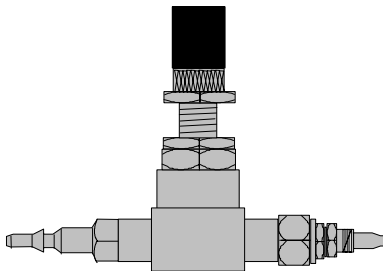
They must be handled with care especially when they are tightened.

1.1. STANDARD VALVE



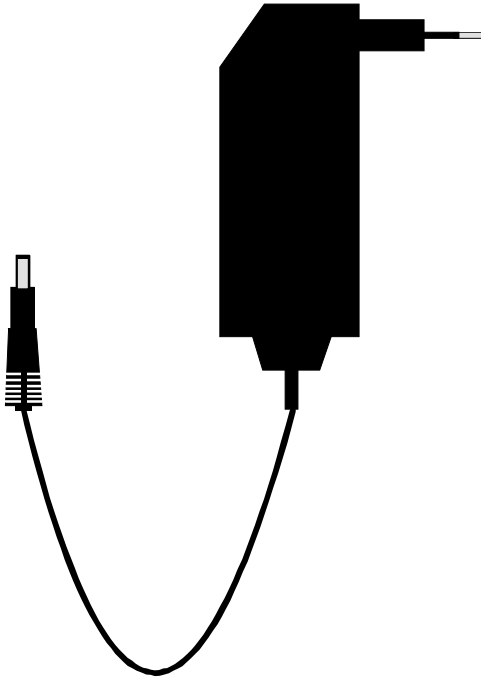
HOKE type valve Ref. 133566B/MM with a STAUBLI male RBE 3 connector.

1.2. OPTIONAL VALVE



HOKE type valve Ref. PC8503 with a STAUBLI male RBE 3 connector.

2. CHARGER



The power supply unit is a rapid charger for NiCd batteries. It converts a supply voltage from the network (100 to 240 V AC) into a continuous low voltage. The unit detects falls in peak voltage during battery charging and completes the rapid charge at this point. The instrument is also equipped with a safety timer which interrupts the rapid charge if for any reason no fall in voltage is detected. The converter has no changeover switch and operates as soon as it is powered up. Charging begins immediately and the light comes on to confirm this. When the rapid charge has been completed the light begins to flash.

The instrument is protected against current surges and short-circuits by a thermal fuse. Do not use any other type of fuse.

This converter also has detachable pins and can therefore be adapted for all types of electric sockets.

Precautionary measures when using the charger and batteries

Read the following instructions before using the charger:

- use only in an enclosed place which is not damp,
- do not use with non-rechargeable batteries,
- the batteries for the CDF are of Cadmium-Nickel type and contain 10 cells. Their charge time is less than 2 hours. As with any item containing mercury, cadmium and lead, they must not be thrown away and must be disposed of in a way which complies with special conditions relating to the environment.

Chapter 6

READOUT MESSAGES

1. ERROR MESSAGES

The **Leak/Flow Calibrator** can display the following error messages:

| | |
|--|---|
| <p>The battery is low. (If the instrument is not charged it will automatically switch off).</p> | <p style="text-align: center;">BATTERY LOW !!! CONNECT THE CHARGER</p> |
| <p>The instrument has not been used for 29 minutes, the display warns that it will automatically switch off. Press on any key to keep the LFC switched on.</p> | <p style="text-align: center;">2 MN BEFORE POWER DOWN</p> |
| <p>The flow or the pressure is too high. Adjust the valve or change the measurement range.</p> | <p style="text-align: center;">OVERPRESSURE FLOW RATE TOO HIGH</p> |
| <p>When the instrument is on automatic and the leak increases beyond 20 ml/min, a message warns that the measurement port must be changed to go into the 200 ml/min range.</p> | <p style="text-align: center;">WARNING !!! CONNECT TO OTHER MEASUREMENT PORT PLEASE</p> |
| <p>If the leak increases, the display shows an error message and goes into wait mode.</p> | <p style="text-align: center;">WARNING !!! FLOW RATE TOO HIGH</p> |
| <p>The instrument needs to be regularly calibrated (in general once a year). When the warning calibration date is passed, the opposite message will appear on the display. This message don't stop the instrument. It's possible to make disappear the message by changing the warning date (see the chapter 4 paragraph 3.12. : "Maintenance function" but don't forget to do a calibration</p> | <p style="text-align: center;">CALIBRATION DATE PAST !!!</p> |

Chapter 7

IN THE EVENT OF OPERATIONAL PROBLEMS

1. BATTERY PROBLEM

It is essential that the internal battery is completely discharged once a year.

In order to discharge the battery, keep the instrument switched on until the battery runs out.

2. OVERPRESSURE OR HIGH FLOW PROBLEM

Close the valve and restart the measurement.

APPENDICES

LEAK/FLOW CALIBRATOR

1. TECHNICAL CHARACTERISTICS

Specification

The **Leak/ Flow Calibrator** possesses a casing made out of shock resistant polymer. It is delivered with a flow valve and an electrical charger.

External dimensions

| | |
|--------|---------|
| Length | 345 mm |
| Width | 192 mm |
| Depth | 85.5 mm |
| Weight | 3 kg |

Power

| | |
|------------|--------------|
| Air supply | -1 to 10 bar |
| Electrical | 12V DC |

Pneumatic

| | |
|------------|------------------------------|
| Connectors | Quick connector STAUBLI type |
|------------|------------------------------|

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