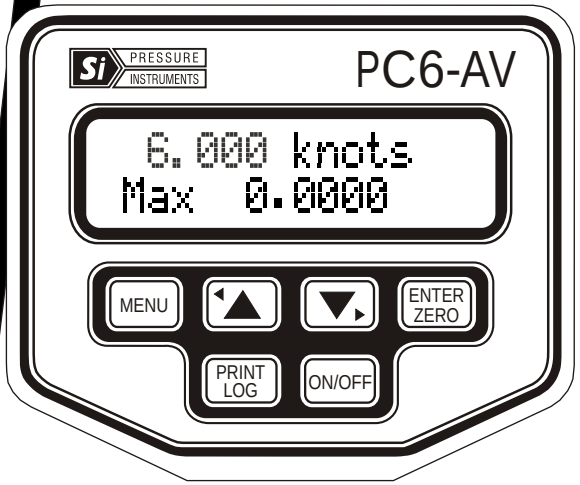
Pressure Calibrator

PC6-AV

operating manual



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Part No: 31-0353 Iss.3.

PRESSURE INSTRUMENTS

CONTENTS

WELCOME

This detailed operating manual will help you to become familiar with the many features of the PC6-AV Calibrator, the simple step by step instructions will quickly guide you through the procedures for using the calibrator and other items needed for accurately testing and calibrating numerous types of instruments. Please take time to carefully read the whole manual before you begin to use the PC6-AV.

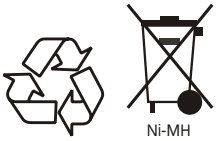
SAFETY WARNING!

HIGH PRESSURE*:*

Uncontrolled release of high pressure is hazardous to personnel and may cause damage to equipment. Before connection of any pressure component to the Pc6 ensure that the component(s) is/are isolated from the pressure supply and any internal pressure is released slowly.

RECHARGEABLE Ni-MH BATTERIES

Rechargeable Ni-MH batteries must be recycled or disposed of properly.
May explode if damaged or disposed of in fire. DO NOT short-circuit.
CAUTION: Use charger supplied by SI Pressure Instruments only.



Keys

Press to turn unit on and off

Press to access the menus

Press to accept functions or settings

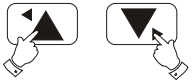

Press to move cursor up/left or increase values


Press to move cursor down/right or decrease values

Press to print/log/start event depending on previous setting

Activating Functions

Select menu

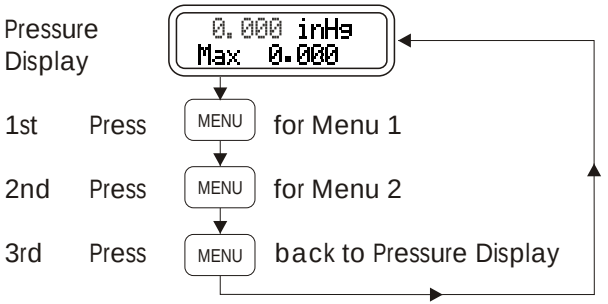

position cursor under function

press the Enter key

Exit

To exit out of any menu select 'Exit' option, or press MENU key.

Menu Selection



Data Entry

Press ▼ or ▲ to position cursor and press ENTER ZERO to select required alphanumeric. Press ENTER ZERO key to release cursor.

For next data entry, repeat the above procedures then press MENU once all data is entered

Note: To quickly scroll through alphanumeric lists hold down the ▼ or ▲ key.

MANUFACTURER'S SPECIFICATIONS

Model	Pressure Range (FS)	Overload Pressure (FS)	Accuracy (FS) Better than	Resolution (FS) Better than
PC6-0002A-I-1-P-AV	0 to 2 bar (+60 inHg) absolute 0 to 600 knots*	10%	0.025%	0.01%

Pressure Units	mbar, inHg,knots, kPa,MPa,psi,kg/cm2,atm, inH_20, mH_20, mmH_20, bar, mmHg, unit, unit2
Overload Warning	Flashing display and audible tone at 110% of FS
Resolution	6 digits
Temperature Display	Temperature of pressure sensor module
Operating Temperature	-20 to 70°C
Calibration Temperature	20°C ± 2°C
Storage Temperature	-40°C to 70°C
Temperature Effects	0.001% of reading/°C between 10-40°C
RS232 Parameters	baud rate 1200, 2400, 4800, 9600, stop bits 1 or 2, status ON/OFF
Zero Reset	Manual keyboard operation
Data Capacity	436 records into a maximum of 20 files, 32k memory additional 585 records, (32k memory option available)
Display	Backlit LCD, 16 character x 2 line alpha numeric
Humidity	5 to 95% Relative Humidity non condensing
Resolution Select	Increase or decrease by a factor of 10
Power Supply	6V Ni-MH rechargeable battery pack (see warning page ii)/ mains operation via charger (supplied).
Battery Life	Fully charged - 10 hours
Recharge Time	14-16 hours for full charge
Low Battery	Continuous check, audio and visual warning
Dimensions	92 x 110 x 59mm
Weight	850 grams (Calibrator head only)
Microprocessor	H8/2138
Recommended Recalibration Period	1 Year
Electrical Connections	
Battery	2 pole miniature round connector
RS232	8 pole miniature round connector
Pressure Media	Non-corrosive gases (for other media, contact SI)
Pressure Connections	3/8"BSP Quick-fit. 8mm O/D hose connector
Pressure Switch Input	Standard 2mm sockets
Software (optional)	The '*SiCal PRO*' software will present downloaded data in various graphical forms such as gauges or a scrolling bar & remotely control the PC6-PRO via the RS232 cable linked to a PC. The downloaded data can be stored in a variety of file types compatible with most analysis database and word processing programs. Cal. procedures can be uploaded to the PC6-PRO.
System requirements:	486 with maths coprocessor. Windows® 95 or higher is required.

knots

Pressure to airspeed conversion for the range 0 to 600 knots using 'British Standard 2G 199 :1984'

DESCRIPTION

1.0 Introduction

The unit is a microprocessor controlled, precision instrument powered by an internal 6V rechargeable battery pack. It is portable and capable of accurate pressure measurement. This section describes the equipment from an external viewpoint, allowing the user to become familiar with the various controls and connections provided.

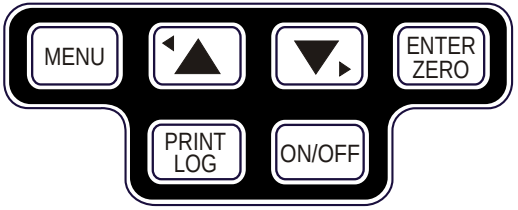
1.1 General

The PC6 is housed in a three part anodised aluminium case with a liquid crystal display unit at the front and a six button membrane keyboard. The main body contains the circuitry, connections, internal transducer and battery pack.

1.2 Keypad

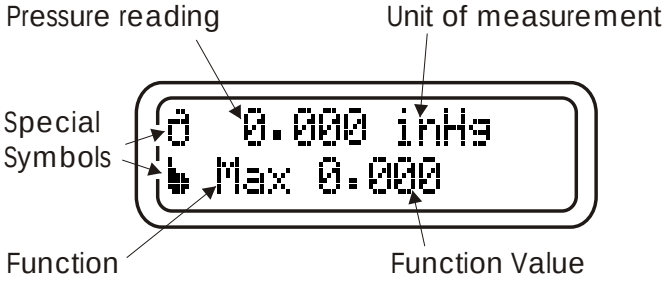
The Keypad is a non-tactile membrane keyboard with six buttons. The keyboard layout is shown below.

Note: An audible bleep accompanies every key operation.



1.3 Liquid Crystal Display (LCD)

The LCD is a 16 character x 2 line alphanumeric LED backlit display which is capable of displaying special characters.



1.4 Connection Panel (See Page 3, Fig 2)

The connection panel is located at the top of the case and provides input / output connections as detailed in Fig.2

1.4.1 A 3/8"BSP 'Quick-fit' coupling to accommodate the hand pump.
8mm O/D hose fitting on pump to connect to item under test.


COUPLING

1.4.2 An 8 way circular miniature connector is used for communication with RS232 standard communication protocols/equipment. The user software '*SiCalPro*' (optional) can be used to remotely monitor or download data from the PC6 via this connector.
(Optional RS232 cable - Part No. 01-0625)

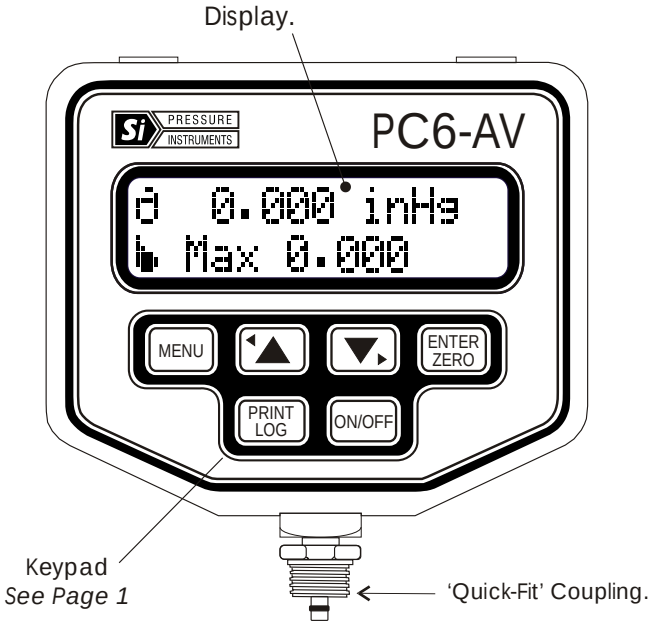
RS232

1.4.3 The 2 way circular miniature connector is used for the battery charger (provided).

CHARGER

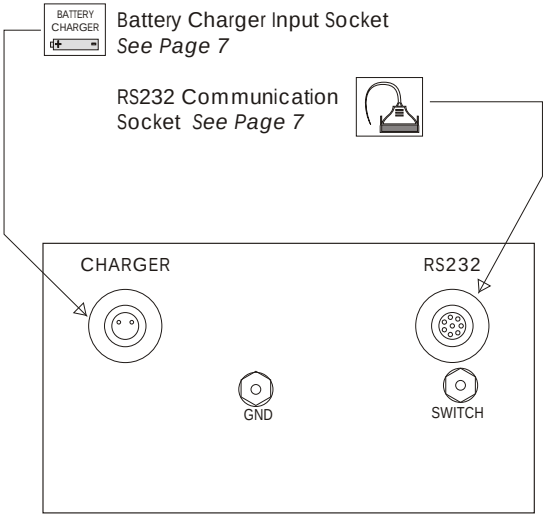
Front View: LCD & keypad

Fig 1



Top View: connection panel

Fig 2



GND Common Ground Socket
SWITCH Pressure Switch Input.

PRESSURE DISPLAY - Allows the user to operate the PC6 for pressure measurements. (Display Functions)

Menu 1

- **UNITS** — Selection of pressure unit.
  - mbar — millibar
  - inHg — Inches of Mercury (at 4°C)
  - knots — knots (for absolute units see item 2.12, page 10)
  - kPa — kiloPascals
  - Mpa — Mega paskals
  - psi — pound force per square inch
  - kg/cm2 — Kilogrammes force per square centimeter
  - atm — atmospheres
  - inH_2O — inches of Water (at 4°C)
  - mH_2O — meters of water (at 4°C)
  - mmH_2O — millimeters of water (at 4°C)
  - bar — bar
  - mmHg — mm of Mercury (at 0°C)
  - Unit1 — First user defined unit } Please see 3.6 page 23
  - Unit2 — second user defined unit } Please see 3.6 page 23
  - Exit — Returns to menu 1
- ALT (ft) — Altitude in feet } Refer to item 2.12, page 10 when using 'knots'.
- ALT (m) — Altitude in metres } Refer to item 2.12, page 10 when using 'knots'.
- QFF — Airfield barometric pressure at sea level. } Refer to item 2.12, page 10 when using 'knots'.
- MAX — Displays the maximum pressure measured since the last reset.
- MIN — Displays the minimum pressure measured since the last reset.
- % — Displays the pressure as a percentage between user pre-set high and low alarm values.
- TARE — Displays the pressure at the time of tare.
- Switch — Indicates the status of the pressure switch (OPEN/CLOSED)
- Leak — Allows the PC6 to measure pressure changes over time.
  - Start — Starts the leak test.
  - Set-Time — Sets the leak test time.
  - Exit — Reverts back to pressure display mode.
- Temp °C — Allows the user to monitor the temperature around the selected pressure transducer in pressure display mode.
- Date & Time — Allows the user to monitor the date & time of the on board real time clock in pressure display mode.
- File — Allows the user to view or manipulate a file previously stored in the filing system.
  - View — Allows the user to see stored file.
  - Export — Outputs a stored file.
  - Import — Imports a file from Sicalpro
  - Delete — Deletes a stored file.
  - Exit — Reverts back to pressure display mode.
- Exit — Returns to Pressure Display mode. *(SHORTCUT: To abort any menu level, simply press the MENU key).*

FUNCTIONS (MENU 2)

SETTING MENU - To set user specific functions. *(Set Functions)*

Menu 2

- **ALT** — Configure altitude settings
  - **Datum** — User defined setting
    - **View** — Allows user to view current datum
    - **Set** — Allows user to define current datum
  - **ISA** — Displays 'International Standard Pressure'.
  - **Exit** — Reverts back to pressure display mode.
- **QFF** — Configure QFF mode
  - **Height** — Sets Local height
  - **Temp** — Sets local temperature
  - **Exit** — Reverts back to pressure display mode.
- **High** — Allows the user to set a High Pressure Alarm Limit. (by using the increase/decrease facility above which an alarm sounds.)
- **Low** — Allows the user to set a Low Pressure Alarm Limit. (by using the increase/decrease facility below which an alarm sounds.)
- **Display Light** — Switches ON or OFF the LED back light.
- **Resolution** — Selects high, normal or low resolution.
- **Event** — Sets up the event status for RS232 output and for logging functions.
  - **Key** — Sets key driven output.
  - **Timed** — Sets timed output defined by the user.
  - **Exit** — Reverts back to pressure display mode.
- **Log** — Allows the user to setup, amend and view files for logging.
  - **Log** — To select a log file and start logging.
  - **View** — To look at a file.
  - **Delete** — Deletes a file.
  - **Status** — To enable or disable logging.
  - **Export** — To export logged files.
  - **Import** — To import files from a PC. (see 'SiCalpro' software instructions for exporting files to the PC6)
- **RS2332** — Settings for RS232 communications.
  - **Status** — To enable RS232 communication.
  - **Baud-rate** — To select the baud rate.
  - **Stop-bits** — To select the number of stop bits.
  - **Exit** — Reverts back to pressure display mode.
- **Date/Time** — Sets up Date & Time parameters
  - **Set** — Sets the date & time.
  - **View** — To look at date & time.
  - **Exit** — Reverts back to pressure display mode
- **Language** — Allows user to change language

- Zero — Will reset pressure reading to Zero. (This will remove Zero offset permanently / NOT available for absolute units).
- Port — Selects current pressure modules (P1,P2,DPM)
- Power_Off — Allows the user to set Power_Off time or to switch the function on or off.
  - Key — Switches the auto-power function off.
  - Timed — Allows the user to set the auto-power off time in minutes.
  - Exit — Reverts back to Pressure Display.
- Exit — Reverts back to pressure display mode.

FUNCTIONS (MENU 3)

CAL MENU

Menu 3

- **SPAN** — Allows user to set span.
  - **CONTINUE** — Starts span calibration procedure.
  - **EXIT** — Returns to Cal Menu.
- **HISTORY** — Allows user to see overload and zero-span history.
  - **OVERLOAD** — Displays period of time over which overload occurred.
  - **ZERO-SPAN** — Displays date last calibrated, last span set, range and overload value.
  - **PC6 S/No** — Displays the unit's serial number.
  - **PM S/No** — Displays the serial number of the currently selected pressure module.
  - **EXIT** — Returns to Cal Menu.
- **Language** — Allows user to download different languages.
- **UNITS**
  - **View** — Displays the two current user-defined units.
  - **Alter** — Allows user to modify the conversion factor and/or text for the two user-defined units.
  - **Exit** — Returns to Cal Menu
- **EXIT** — Returns to Pressure Display.

OPERATING INSTRUCTIONS

1.5 Switch Test Activate 'Switch' function in menu 1. The switching pressure of a pressure switch can now be monitored by connecting the contacts of the pressure switch between the INPUT 'GND' and 'SWITCH' sockets on the connection panel and pressurizing the pressure switch.

1.6 RS232

If the RS232 facility is to be used then connections to the 8-way socket must be made to the specifications given in the table below. Alternatively an RS232 communication cable can be purchased from SI suitable for most RS232 applications as shown below.

To RS232 socket on PC6

Cable Part No: 01-0625

Standard 9-way 'D'type female connector

RS232 Connections Table

PIN No.	INPUT/OUTPUT	SIGNAL	STATE
1	Output	Data Terminal Ready (DTR)	Held High
2	Output	Transmit Data (TxD)	
3	Input	Receive Data (RxD)	
4	Output	Request To Send (RTS)	
5	Input	Clear To Send (CTS)	Active High
6	Output	Do not use	
7	Common	Ground	
8	Input	Do not use	

Note: 1. Pin 6 and pin 8 should not be used.

RS232 Output

Connect the PC6 to a printer or computer using a suitable cable (not supplied) as detailed above and set the parameters as detailed in Para. 2.9 & 3.1. The output can now be obtained as 'single shot' or 'timed' as follows:

Single Shot - This output is always available in Display mode when RS232 status & Log status are OFF. The output is obtained each time the PRINT LOG key is pressed (provided any previous output is complete).

Warning: The PC6-PRO must be switched off prior to connecting or disconnecting the RS232 cable.

Timed - This output is available in Display mode when RS232 status is ON & Log status is OFF. The output cycle is initiated by pressing the PRINT LOG key. Pressing the MENU key cancels the output. Once initiated, the output is repeated at the selected time interval (see 'Event' function, page 26) until the MENU key is pressed.

1.6.1 Charger The internal battery pack may be recharged (when indicated by the battery low message) by plugging the charger (supplied) into the 'CHARGER' socket of the PC6.

CAUTION: When recharging internal batteries, only the charging unit supplied with the PC6 should be used.

1.7 Messages & Parameters

The PC6 registers pressure input at switch on after the initial start-up message. The pressure reading is displayed in the top left hand corner of the LCD (Fig.3 Page 2). Pressure values are monitored, alarm values are compared, alarm warnings and other information messages displayed until the PC6 is switched off.

Memory Errors:
Any read / write errors to memory detected at switch on will be reported as: Memory Error 'Error No.'
Error Numbers:-
0 - Onboard eeprom; 8 - RTC; 9 - 2nd Onboard eeprom.
Errors with Pressure Modules will be indicated by the message: "No P1 (or P2 or DPM) Module" preceeded by "PM EEPROM ERROR" at power on.

1.7.1 When switched on, the PC6 registers the same state as when last switched off. The display mode (Operating/Set), units of measurement, function and parameter settings, alarm limits and RS232 output control, logged parameters are all retained at switch off, with the exception of the following conditions :

1.7.2 A battery low state occurring prior to the switch off. When switched on, the PC6 registers the latest retained set of parameters.

1.7.3 Any TARE value set during use is not retained and therefore should be set, if required, each time the PC6 is switched on.

1.7.4 Maximum and Minimum values are not retained. Current values reflect pressure monitored from the start of the pressure input.

1.7.5 If the PC6 is switched off during a LEAK test then the test will be void. When switched on again the PC6 will start up in LEAK test mode.

1.7.6 Switch off When the ON/OFF key is pressed the 'switch off' message is displayed for five seconds accompanied by an audible bleep. Normal operation may be resumed by pressing any key during switch off.

1.7.7 Auto Switch off The PC6-PRO will automatically turn itself of after a set period (See Page 20 for instructions)

1.7.8 Pressure Overload (Bleep rate 4 Hz) 'OVERLOAD' occurs when input pressure exceeds overload pressure level.

1.7.9 Low Battery Detect (Bleep rate 1 Hz). 'Low Battery' occurs when internal battery pack drops below 5.5V. Message flashes for 4 seconds, after a further 30 seconds, low battery detection is re-enabled.

1.7.10 Pressure Switch State Change (Bleep rate 2 Hz)
Occurs in pressure mode with the pressure switch state display being selected. When the connected pressure switch changes state, the pressure value (upper line) is frozen and the pressure switch state (lower line) display is flashed at 1 Hz unless a log file is open. Normal display update resumes when the ENTER ZERO key is pressed.

1.7.11 Printer Busy (Bleep rate 1 Hz)

If the receiving device is not ready for input (e.g. device not connected or handshake LOW), 10 seconds after starting an output cycle (single shot or timed output) the message 'Printer Busy' is flashed on the display, together with an audible warning. If the device does not accept input within the next 5 seconds then the output cycle is canceled and output is stopped until the [PRINT LOG] key is pressed again.

1.7.12 Outside User Set Alarm Values (Bleep rate 2 Hz)

Occurs when measured pressure is lower than the user set Low alarm value or greater than the user set High alarm value and the 'outside limits' message is flashed. Indication ceases when pressure is equal to either alarm value or between the values.

1.7.13 Display Hold (Bleep rate 2 Hz)

Occurs in pressure mode. If the [ENTER ZERO] key is pressed once (less than 1 second) the pressure value (upper line) is frozen and the lower line is flashed with the 'Display Hold' message at 1 Hz. Normal display update resumes when any top row key is pressed.

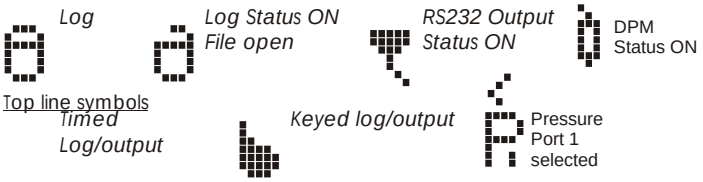
1.7.14 RS232 Output Format The output format is as follows:

LF
Time & date 23:13:30 220997 +LF
display top line (16 characters) + LF
display lower line (16 characters) + LF
alarm flag (1 character) + LF
Null terminator (0)

1.7.15 Alarm Flags A single character is output to indicate the various pressure alarm conditions as given below:

* overload pressure level exceeded
(pressure warnings, 1.7.8 & 1.7.12)
> pressure exceeds user set high limit
< pressure below user set low limit
" " a space if no alarms apply.

1.7.16 Display Symbols



Note: If two (or more) conditions occur which require a message display, the highest priority condition in the above list will be displayed. The sequence of messages given above set the priority except 'Switch Off' which comes last.

1.7.17 Alt (height) warning

An "Out of Range" message is displayed if the height is exceeds 105,000 ft or is less than -3000 ft (32004m, -914.4m)

1.7.18 Knots (limits)

An "Outside limits" message is displayed if the reading exceeds 600 knots.

HOW TO SELECT FUNCTIONS (MENU 1)

1.8 Units

To change the units of pressure, proceed as follows:

• Press the MENU key once, then press ENTER ZERO key to choose the units sub-menu

• Select required unit by pressing the ▼ key and then press ENTER ZERO key.

The display will indicate the pressure in the selected unit and the pre-selected 2nd line function.

1.9 Alt (ft) *(when using 'knots' on absolute units, refer to item 2.12)*

To display altitude in feet:

• Press the MENU key once. Use the ▼ key to select 'Alt (ft)' option and then press the ENTER ZERO key to accept.

1.91 Alt (m) *(when using 'knots' on absolute units, refer to item 2.12)*

To display altitude in metres:

• Press the MENU key once. Use the ▼ key to select 'Alt (m)' option and then press the ENTER ZERO key to accept.

2.0 QFF *(when using 'knots' on absolute units, refer to item 2.12)*

This mode measures the sea level pressure using local height and temperature correction. To set the local values refer to item 2.5 on page 14. To display 'QFF' correction:

• Switch the unit on MENU

• Press the ENTER ZERO key once and select 'QFF' using the ▼ key and press the key to accept.

2.1 Max,Min, Temp°C, Date & Time,%,Switch

To display one of these functions, proceed as follows:

• Press the MENU key once and then scroll to the required function using the ▲ or ▼ key and then press ENTER ZERO key to select it.

The LCD will show the pressure on the top line and the 2nd line will display the function that has now been selected.

2.11 ***Tare:***

The Tare value can be displayed on the bottom line by selecting 'Tare' from the menu using the ENTER ZERO key and pressing the ▼ key.

To activate Tare function: hold down the ENTER ZERO key for 4 seconds while in the pressure display mode. The unit will bleep after two seconds when the Max. and Min. values reset. At four seconds another bleep will sound as the displayed pressure now resets to zero. This is a temporary function and will be cancelled when the unit is switched off.

2.12 Knots (absolute units)

When using the 'knots' unit on an absolute PC6, use the tare function as described above before proceeding.

Selecting 'Alt (ft)', 'Alt (m)' or 'QFF' whilst measuring knots, the second line of the display will default to 'Max' mode.

2.2 Leak Test

To carry out leak tests, proceed as follows:

- Press the MENU key once and scroll to the 'Leak' function using the ▼ key. Press ENTER/ZERO key to select.

Presented with the leak test sub menu, the options 'Start' and 'Set Time' are given as shown below.

Leak Sub-menu

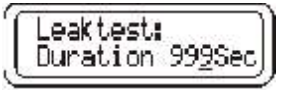
'Set Time' To set the duration of the leak test.

Scroll using the ▼ key to select 'Set Time' and press the ENTER/ZERO key.

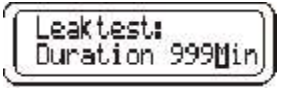
With the first digit now flashing, press ENTER/ZERO and then select the number required using the ▲ ▼ keys and press ENTER/ZERO key. (e.g. time set to 999 min.)

With the second digit flashing, press ENTER/ZERO and again select the number required and press ENTER/ZERO key.

Repeat procedure for third number and press ENTER/ZERO key.



Now select the units of time measurement (e.g. seconds, minutes, hours, days, etc.) Scroll through the units with the ▲ ▼ keys and press ENTER/ZERO



Once the leak test time has been set press the MENU key to return to the leak test sub-menu.

- Select 'Start' using the ▲ ▼ keys and press ENTER/ZERO to start the leak test.

The top line shows 0.0000 pressure and the bottom line shows the current pressure.

- Start the leak test by pressing the ENTER/ZERO key.

The top line displays the difference in pressure while the bottom line shows the start pressure and the time counting down.

- When the leak test has finished, to start the leak test again press the ENTER/ZERO key once to reset the time and again to start the test.
- If no other leak test is to be carried out, press the MENU key to return to the leak test sub-menu.

2.3 File

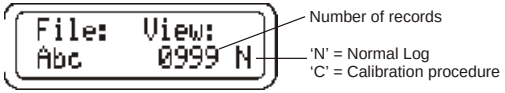
This function allows the user to view, export, Import and delete previously stored files.

To use the filing system proceed as follows:

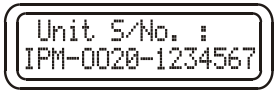
- Switch the unit on.
- Press the MENU key once and scroll to 'File' using the ▼ key and press ENTER/ZERO .

2.3.1 To view a file, proceed as follows:

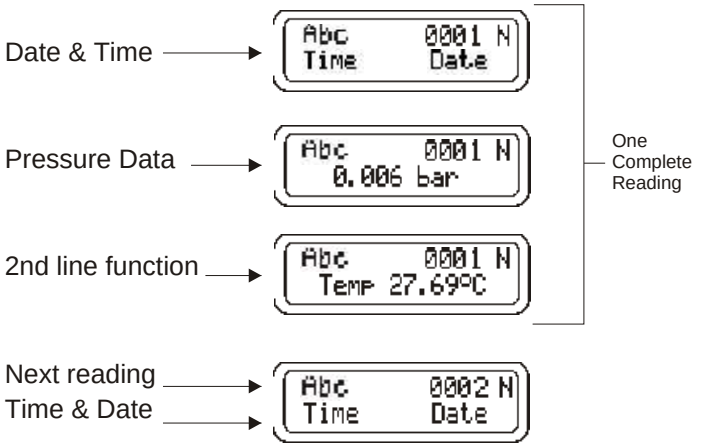
- Select 'View' using ▼ key and press ENTER/ZERO .
- The latest filename is shown in the bottom left hand side of the display. The record count is shown in the bottom right hand side. To select this file press ENTER/ZERO. If another file is required then scroll through the filenames using the ▲ ▼ keys and then press ENTER/ZERO key.



- To move through the record now selected, press the ▼ key or the ENTER/ZERO key. This will first show the 'IPM / EPM' serial number from which data was read.



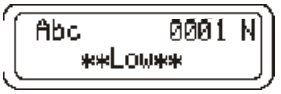
- To view the following records in the selected file use the ▼ or ENTER/ZERO key to advance to the next screen.



Pressing the ▼ or ENTER/ZERO key will enable the user to go through the records. Once the last record has been viewed an **END** message is displayed.

The records then 'wrap around' so the user can move to the first or last file record using the ▲ ▼ keys.

Note: At the time of logging, if the pressure is above or below the set limits then a 'High' or 'Low' message will appear after the Pressure Data screen.



2.3 File (continued)

2.3.2 To *Export* a file, proceed as follows:

- Scroll the cursor using the ▼ key and select 'Export' and press the ENTER/ZERO key.
- Select a file to export using the ▲ ▼ keys and press the ENTER/ZERO key

  For export to SicalPro, please do not press the Enter key after selecting the file.

2.3.3 To *Import* files, proceed as follows:

- Scroll to 'Import' using the ▼ key. Once you finished a calibration procedure in 'SiCalPro', click on 'Export', press the ENTER/ZERO key on the Pc6 to download. The message "downloading Cal" will be displayed. Once SiCalPro gives "All done" message, press the MENU key. Choose 'Yes' when prompted to 'Stop?'

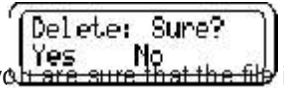
2.3.4 To *Delete* files, proceed as follows:

- Scroll the cursor using the ▼ key and select 'Delete' and press the ENTER/ZERO key.

The following options are available:

- If you want to delete a particular file then select 'File' using the ▼ key and then press the ENTER/ZERO key.
- Select a file to delete using the ▲ ▼ keys and press the ENTER/ZERO key.

The unit will then display:



If you are sure that the file is to be deleted then the 'Yes' option should be selected using the ▼ key and then entered using the ENTER/ZERO key.

Once the operation is completed the display will return to the 'File' sub-menu.

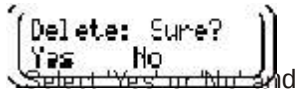
If another file is to be deleted then repeat the procedure.

If no more files are to be deleted then press the MENU key to return to the pressure display.

Note: Pressing the MENU key once at any time during the procedure will take you back to the 'File' sub-menu.

If all the files in the PC6-PRO are to be deleted then select 'ALL' in the Delete sub-menu and press the ENTER/ZERO key.

The following message is displayed:



- Select 'Yes' or 'No' and press the ENTER/ZERO key.

SET- MENU
(MENU 2)

2.4 Alt

To set or view a user defined datum or use the standard pressure setting (ISA) proceed as follows:

- Press the MENU key twice to enter the 'Set' menu.
- Select 'Alt' and press the ENTER ZERO key.

Datum:

- Select Datum using the ▲ ▼ keys and press the ENTER ZERO key to accept.
- Select 'View' and press the ENTER ZERO key. This function displays the last defined datum and sets this as the current datum.
- Select 'Set' and press the ENTER ZERO key. This function allows the user to input a new datum.
- Select the digits to be changed by moving the cursor with the ▲ ▼ keys and pressing the ENTER ZERO key.
- Change to the required value using either arrow key and press the ENTER ZERO key to accept. Pressing the ENTER ZERO key again will move the cursor to the next digit.
- When complete, press the MENU key to return to pressure display.

ISA:

To set datum to the 'International Standard Atmosphere' (1013.25mbar):

- Press the MENU key twice. Select 'Alt' and press the ENTER ZERO key.
- Select 'ISA' and press the ENTER ZERO key to accept

2.5 QFF

This is the meteorological presentation of barometric pressure at mean sea level and is a calculated value based on the local height above sea level and the local temperature.

- Press the MENU key twice and select 'QFF' using the ▼ key.
- Press the ENTER ZERO key to accept.
- Select 'height' and press the ENTER ZERO key.
- Using the ▲ ▼ keys and the ENTER ZERO key, change the local height value as required. Press the ENTER ZERO or MENU key to accept.
- Repeat the above procedure to set the temperature.

The local barometric pressure (QFE) should be measured in mbar. The correction term (QFF_{cor}), in mbar, to be added to the QFE, is calculated as follows:

$$QFF_{cor} = p(10^{m}-1)$$

where $$m = \frac{h}{18429.1 + (67.53 \times t) + (0.003 \times h)}$$

p = pressure (QFE) in mbar
h = height of instrument above mean sea level (metres)
t = the local air temperature °C

2.6 Alarm settings 'High', 'Low'

Note: Not available when reading 'knots'

To set High or Low pressure warning limits proceed as follows:

- Select the 'Set' menu by pressing the MENU key twice.
- Select 'High' or Low' using the ▼ key and then press the ENTER ZERO key.
- Select the digits to be set by moving the cursor with the ▲ ▼ keys and pressing the ENTER ZERO key.
- Set the number to the required value using the ▲ ▼ keys and then press the ENTER ZERO key.
- Repeat the previous two steps to change other digits for the alarm value.

- Once finished setting the alarm limit value press the MENU key to return to the pressure display.

A bleeping warning (2 Hz) and the 'Outside Limits' message will signal that the measured pressure is lower than the user set low alarm value or greater than the user set high alarm value. The bleeping ceases when the pressure is read between the two values.

Note: The PC6 will not allow pressure values to be entered greater than 5% above the maximum working range.

2.7 Display Light

This function may be selected as follows:

- Press the MENU key twice to select the Set menu.
- Select 'Display-Light using the ▲ ▼ keys and then press the ENTER ZERO key.
- Select 'ON' or 'OFF' using the ▼ key and then press the ENTER ZERO key.

Note: The display light can also be set On or Off by holding down the ON/OFF key for more than 2 seconds. The back light is turned off when the PC6 is switched off.

2.8 Resolution

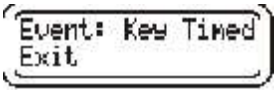
To change the resolution proceed as follows:

- Press the MENU key twice to select the Set menu.
- Select 'Resolution' using the ▲ ▼ keys and press the ENTER ZERO key.
- Select the required resolution (High, Low or Normal) using the ▲ ▼ keys and then press the ENTER ZERO key.

Note: Resolution will change by a factor of 10.

2.9 Event

- Press the MENU key twice to select the Set menu.
- Select 'Event' using the ▼ key and then press the ENTER ZERO key. The Event menu is shown below:



Key:

This results in RS232 output / data storage triggered by key press.

- Select 'Key' using the ▼ key and then press the ENTER ZERO key.

Timed:

This results in RS232 output / data storage at fixed time intervals set by the user.

- Select 'Timed' using the ▼ key and then press the ENTER ZERO key.

- Select the digit to be modified using the ▼ key and press the ENTER ZERO key. Use the ▲ ▼ keys to change

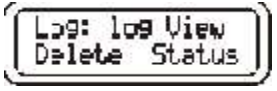
the value and press the ENTER ZERO key.

- Repeat for next digit and press the ENTER ZERO key.
- Change the time measurement units in the same way and press the ENTER ZERO key.
- Press the MENU key to return to pressure display mode.

3.0 Log

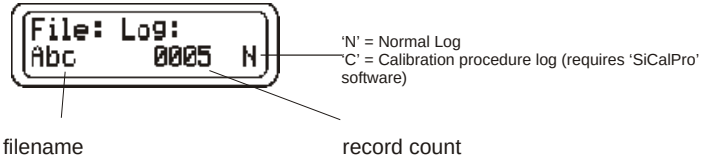
- Switch on PC6.
- Press the MENU key twice, scroll to and select 'Log' and press ENTER ZERO.

  The display gives the option to log a file, view a file or change the log status as shown below:



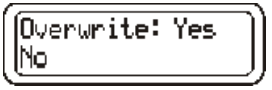
Log:

- Select 'Log' using the ▼ key and then press the ENTER ZERO key.
- Presented with the sub-menu, enter a filename and record count if no files are present, or select a file to log into.



To enter a filename: (max. 8 characters)

- Using the ▲ ▼ keys, move to the filename position and press the ENTER ZERO key.
- Select the characters/numbers to be used to name the file by scrolling up or down at each position and press the ENTER ZERO key when completed.
- Press the MENU key to move on to the record count.
- As with the filename, define the record count and then press the MENU key when completed.
- If a file has already been set up with the same name then the 'Overwrite' option screen will be displayed.



- Start logging by pressing the PRINT LOG key. (see 2.6 'Event' on page 26).

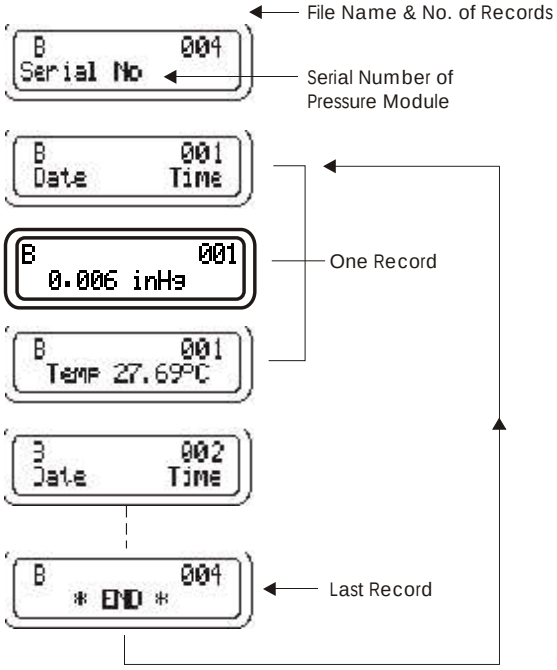
  The  symbol will appear to show file is open.

View:

- Select 'View' from the log menu using the ▼ key and then press the ENTER ZERO key.
- Select the file to view using the ▲ ▼ keys and then press the ENTER ZERO key.

3.0 Log continued

- With the file now selected, use the or key to show the file contents in the sequence shown below.



Note: Use the ▲ or ENTER/ZERO key to scroll the other way. The direction in which the scrolling moves when using the ENTER/ZERO key depends on the last key pressed.

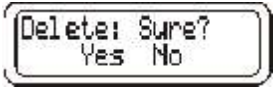
Delete:

To delete a logged file, proceed as follows:

- Select 'Delete' from the log menu using the ▼ key and then press the ENTER/ZERO key.
- Select 'File', 'All' or 'Exit' using the ▼ key and then press the ENTER/ZERO key.

File:

- Using the ▲ ▼ keys, select a file and then press the ENTER/ZERO key.
- A confirmation to delete file prompt is given. Select 'Yes' or 'No' and then press the ENTER/ZERO key.



All:

- Select the 'All' option using the ▼ key and then press the ENTER/ZERO key.
- A confirmation to delete all prompt is given. Select 'Yes' or 'No' and then press the ENTER/ZERO key.

All Files stored on the PC6 will be deleted.

Exit:

- Select the 'Exit' option using the ▼ key and then press the ENTER/ZERO key.

Status:

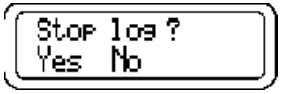
Use this option to enable or disenable logging function.

- Select 'Status' from the log menu using the ▼ key and then press the ENTER/ZERO key.

- Select 'On' or 'Off' and then press the ENTER/ZERO key.
- The display returns to the log menu.

Once a file has been set using the instructions given, the logging process is shown as active with a disc shaped icon in the top left hand corner of the display.

If you should press the MENU key whilst logging is in progress then the following screen appears:



Select 'Yes' or 'No' and then press the ENTER/ZERO key.

Note: Pressing the PRINT/LOG key allows direct access to the log menu. This is only possible if the log status icon is flashing in the top left hand corner of the display.

Export:

See '2.1 File on page 14. For export procedure.

3.1 RS232

RS232 standard communication protocol is available on the PC6. Select the RS232 functions as follows:

- Connect the PC to a printer or computer as described in paragraph 1.6 on page 7.
- Switch on PC6.
- Select the Set menu by pressing the MENU key twice.
- Select 'RS232' option using the ▼ key, then press the ENTER/ZERO key. The RS232 menu is displayed as below:

Status:

- Select 'Status' using the ENTER/ZERO key. Choose 'On' or 'Off' option with the ▼ key and then press the ENTER/ZERO key. The display returns to the RS232 menu.

Baud Rate:

- Select 'Baud-rate' using the ▼ key and then press the ENTER/ZERO key. Select the required baud rate (1200, 2400, 4800 or 9600) using the ▲ ▼ keys and then press the ENTER/ZERO key.

Stop Bits:

- Select the 'Stop bits' using the ▼ key and then press the ENTER/ZERO key. Select either 1 or 2 bits with the ▲ ▼ keys and then press the ENTER/ZERO key.

3.2 Date & Time

To select Date & Time proceed as follows:

- Switch on PC6.
- Press the MENU key twice to select Set menu.
- Select 'Date & Time' option using the ▼ key and then press the ENTER/ZERO key.

To set the time:

- Select 'Set' using the ▼ key, then press the ENTER/ZERO key.

- Select the digit you want to change using the ▼ key and press ENTER/ZERO key. Use the ▲ ▼ keys to change the value and then press ENTER/ZERO key.
- Repeat the above step to change the other digits to set time and proceed to the next set of digits to change the date.
- Press the MENU key to return to the 'Date & Time' menu.

To View date & time:

- Select 'View' using the ▼ key and then press the ENTER/ZERO key.
- Press the MENU key to return to the Date & Time menu.

3.3 Zero ***(not available on absolute units)***

Note: Unlike the 'Tare' function (page 15), 'Zero' reset is a permanent setting.

To reset pressure reading to zero:

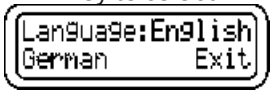
- Press the MENU key twice to select the Set menu.
- Select 'Zero' option using the ▼ key and then press the ENTER/ZERO key.

- Press the ENTER/ZERO key as instructed.

The Pressure Display will now show the pressure value as zero. If however the pressure reading is not within 5% Full Scale the following message will be displayed and the zero reset will not be possible.

3.4 Language

- Press the MENU key twice.
- Scroll to 'Language' using either arrow key and press ENTER ZERO key to select.



- Select the desired language from the options provided and press the ENTER ZERO key.

Note: To download different languages, see *3.7* on page 23.

***3.5** Power_Off*

The PC6 has an auto-power off function. The time after which the unit automatically switches off is adjustable from 1 to 999 minutes. However, the auto-power off will not operate under the following conditions:-

If a key has been pressed during the auto-power off time period.
If a leak test is running.
If the RS232 Status is On.
If the Log Status is On.
If the unit is online with Sical Pro

- Press the MENU key twice.
- Scroll to 'Power_Off' function using the ▼ key and press the ENTER ZERO key.
- Select 'Key' to turn the auto-power function off.
- Select 'Timed' to set the auto-power off time (in minutes) and press the ENTER ZERO key. This automatically turns the auto-power function on.
- Set to desired time using the ▲ ▼ keys and press the ENTER ZERO key.

CAL-MENU
(MENU 3)

Important note:
Should you wish to change zero or span settings at any time, the original calibration made at time of manufacture by **SI Pressure Instruments** will no longer apply. We therefore take no responsibility for any false or inaccurate readings that occur after any changes to span have been made. If the temperature of the pressure sensor is outside the range of 15 to 25ºC it will not be possible to perform the span operation.

Calibration Procedure:
If necessary then the span calibration should be made using a deadweight tester with an accuracy of 0.01% of reading or better, and carried out in a temperature controlled environment at 20°C ±2°.

To maintain the accuracy of the calibrator, do not increase the value of 'tol-ppm' above 50 (see flow charts).

For full calibration which includes Temperature Compensation between 0-50°C the PC6 should be sent back to **SI Pressure Instruments.**

To access the Cal Menu, press all four top row buttons at the same time. A beep will accompany this action. Press the MENU key three times. The functions available are as follows:

Note: Password

To gain access to the 'Span' and 'Units' functions, you will be asked to enter a password. Enter the four-digit serial number located on the label on the rear panel of the unit.

3.6 Span:

Note: The pressure value at which span is carried out is adjustable up to ±5% of the unit's full scale range.

To set span:

- Select 'Span' using the ▼ key and press the ENTER/ZERO key
- A 'Warming up...' message will be displayed and after several seconds you will be prompted to release pressure and then press 'ENTER' to continue.
- The following screen will then be displayed asking you to set a tolerance.

- If you want to change the tolerance value displayed then press the ENTER/ZERO key to select the first digit.
- Using the ▲ ▼ keys, change the first value and then press the ENTER/ZERO key to enter it. The next digit will then be selected. Press the ENTER/ZERO key and change the digit as described above.
- Do the same for the third digit if required and then finish by pressing the ENTER/ZERO key once more.
- If however the value shown does not need to be changed then press the MENU key to continue.
- The following message is then displayed:

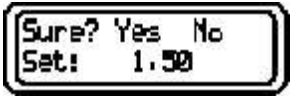
Example Value

- After pressing the ENTER/ZERO key twice and waiting for the fifty readings to be taken, you will be prompted to input pressure up to the maximum value of the sensor in that particular unit. Press the ENTER/ZERO key.
- The unit will now take another fifty readings.
- Provided the readings are within tolerance and 5% of Full Scale you will receive the 'COMPLETED' message.
- Press the ENTER/ZERO key to finish and return to the 'Cal menu'.

Notes: If at any time during the procedure you wish to exit and return to the 'Cal menu' then press the MENU key.
The message: 'Sure ? No Yes' appears. Select 'Yes' to exit or 'No' to continue with the zero calibration.

Absolute: For absolute units you will be presented with the following screen. It displays the current pressure reading on the top line and on the second line you set the corrected value.

Set the required value and press the ENTER/ZERO key.
Select 'Yes' or 'No' at the next screen and press the ENTER/ZERO key.



The pressure display will now show the new value.

3.7 History:

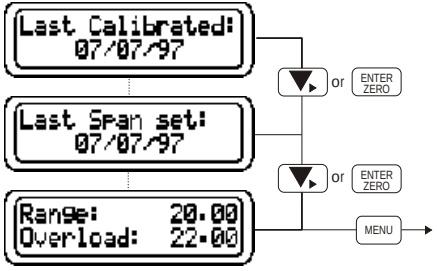
- Press the ENTER ZERO key to view the sub-menus.

Overload:

- To view the overload history move the cursor to 'overload' and press the ENTER ZERO key. The display will show the cumulative time since the unit was last calibrated as in the example below:
- Press the ENTER ZERO key to return to the 'cal menu'.

Span:

- To view the last zero calibration date move the cursor to 'zero/span' and press the ENTER ZERO key.



- As shown above, the last calibration date is displayed first.
- Pressing the ▼ or ENTER ZERO key takes you to the next screen showing the 'last span set' date.
- Pressing the ▼ or ENTER ZERO key again the display shows the range of the unit and the overload setting.
- Press the ENTER ZERO key to finish.
- Press the MENU key to exit to pressure display mode.

PC6 Serial Number:

- To view the unit's serial number move the cursor to 'PC6S/No' and press the ENTER ZERO key.

Pressure Module Serial Number:

- To view the serial number of the selected pressure module, move the cursor to PM_S/No and press the ENTER ZERO key. The accuracy of the sensor will be displayed on the lower line.

***3.8 Language*:** (separate pc software utility needed -contact supplier)

To download different languages:-

- Connect PC6 to PC via the RS232 cable.
- Scroll to 'Language' and press the ENTER ZERO key to select.
- The PC6 will display a 'DOWNLOADING' message until language download is complete.

3.9 Units User-defined unit conversion factors and the text associated with them:-

View:

- Select 'Units' using the ▼ key and press the ENTER ZERO key.
- Select 'View' by pressing the ENTER ZERO key.
  The first user-defined unit will now be displayed with the text on the upper line and the conversion factor on the bottom line. Pressing any key will display the next user-defined unit.

Alter: (to modify the user-defined units)

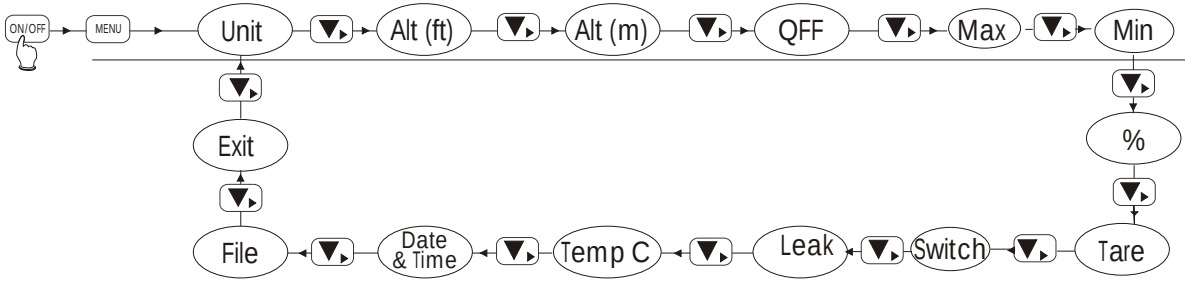
- Select 'Alter' using the ▼ key and press the ENTER ZERO key.
- The text for the user-defined unit is modified first using the ▲ ▼ and ENTER ZERO key.
- Press the MENU key when finished.
- Now modify the conversion factor as above. The conversion factor is the number of user-defined units per bar.

Repeat process if required for the second user-defined unit.

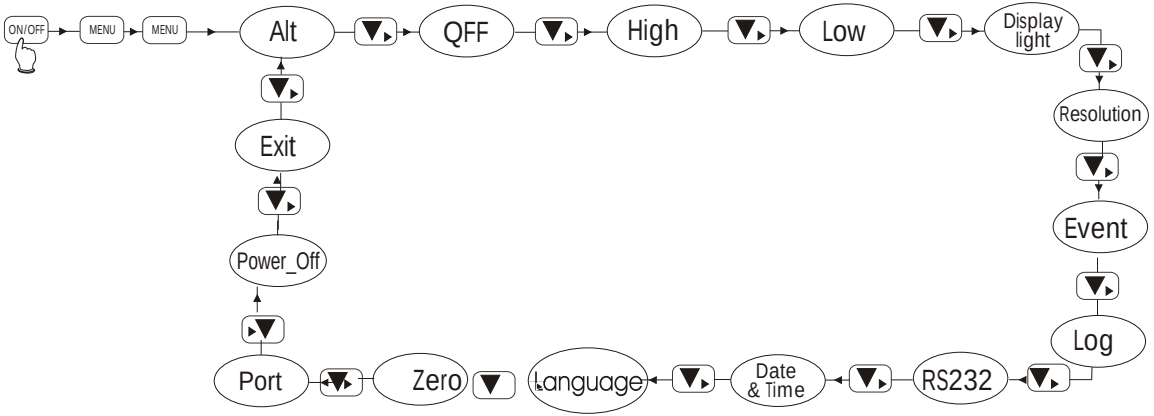
Note: To prevent confusion, it will not be possible to enter text for a user-defined unit that is identical to a factory-set unit in the PC6. Additionally, the maximum value for the conversion factor is 100,000.

FLOWCHARTS

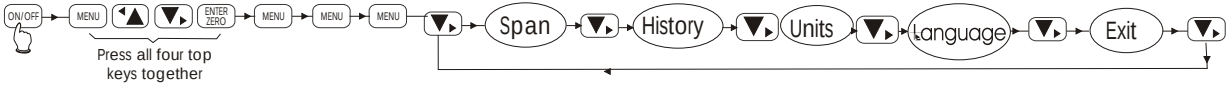
Menu 1
display menu



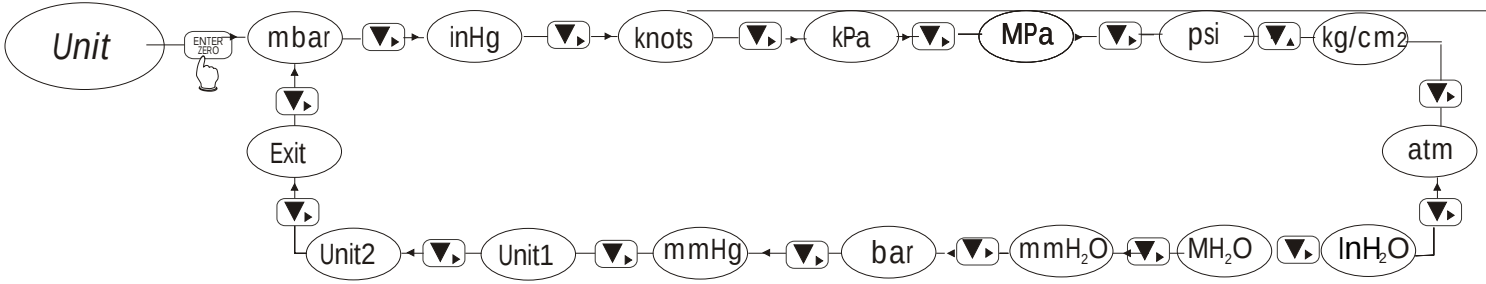
Menu 2
set menu

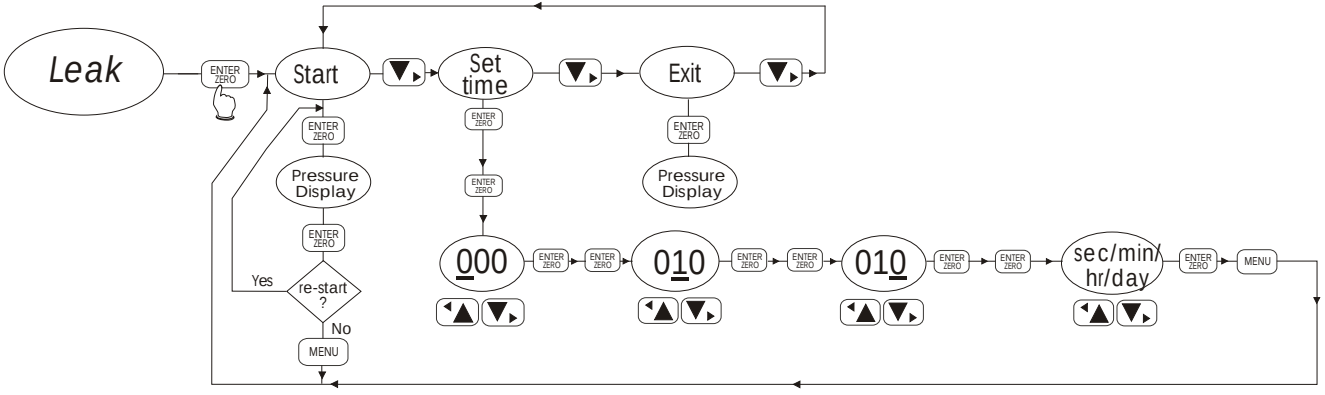


Menu 3
cal menu

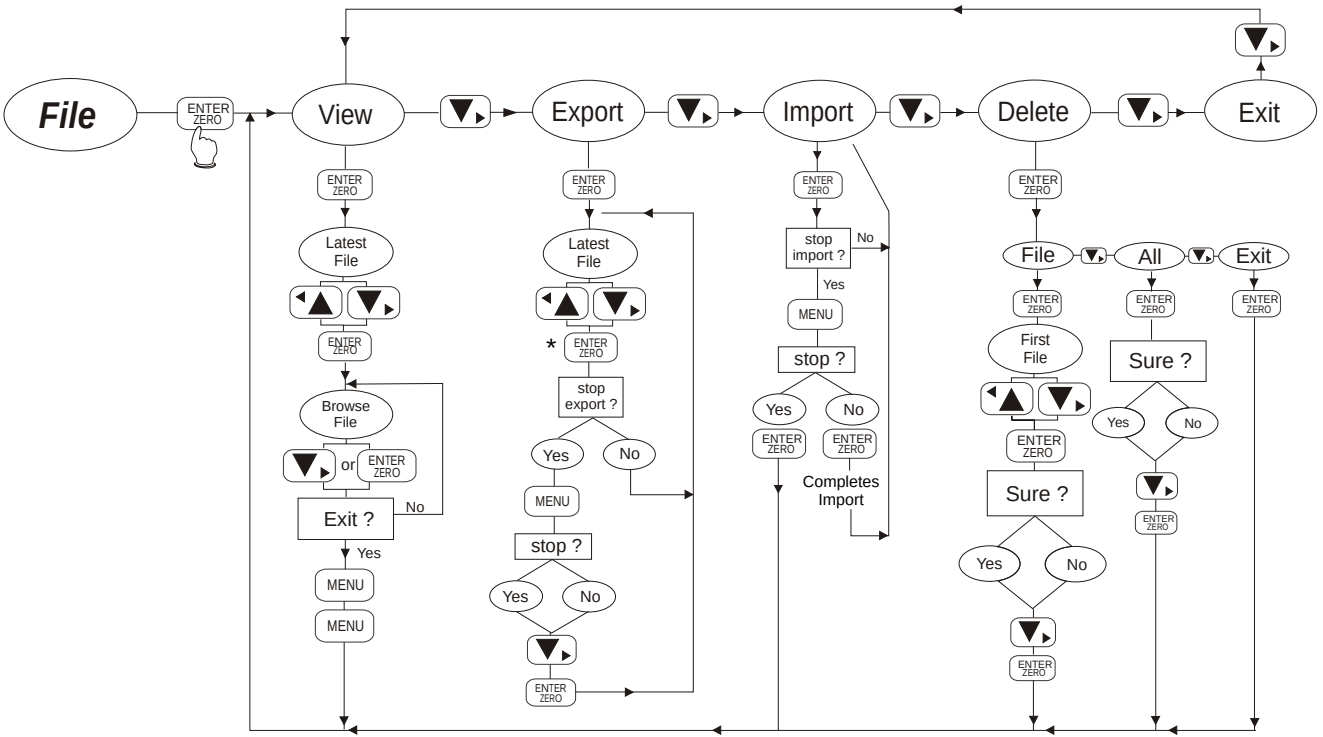


Menu 1 *sub-menu* *unit & Leak*



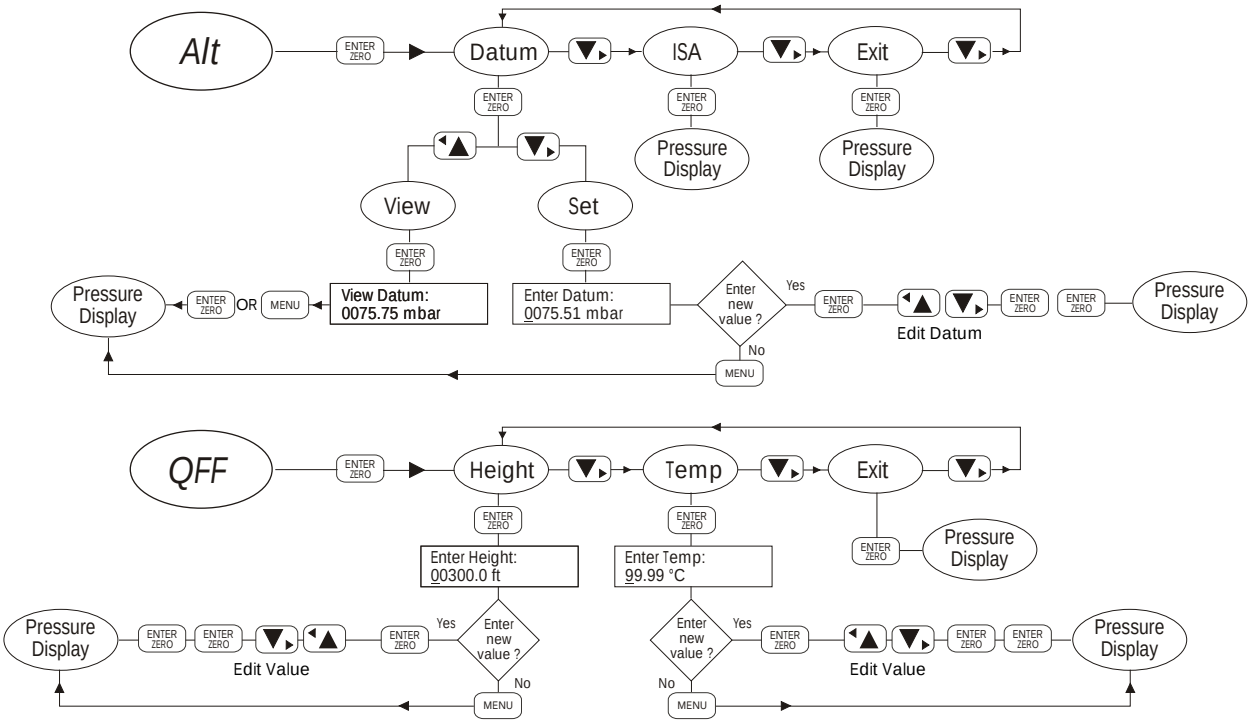


Menu 1 *sub-menu* *File*

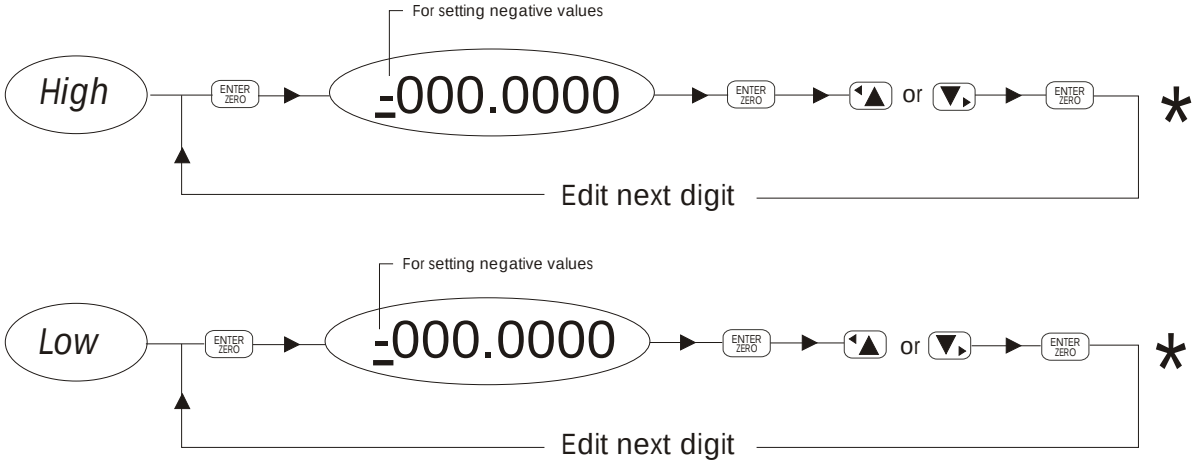


* ENTER ZERO not necessary for file export to 'SiCal PRO'.

Menu 2 Alt & QFF

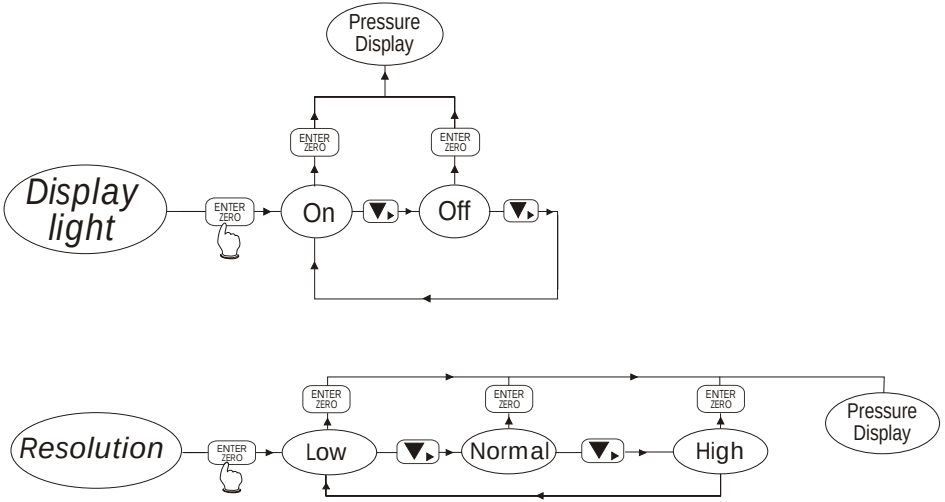


Menu 2 High & Low

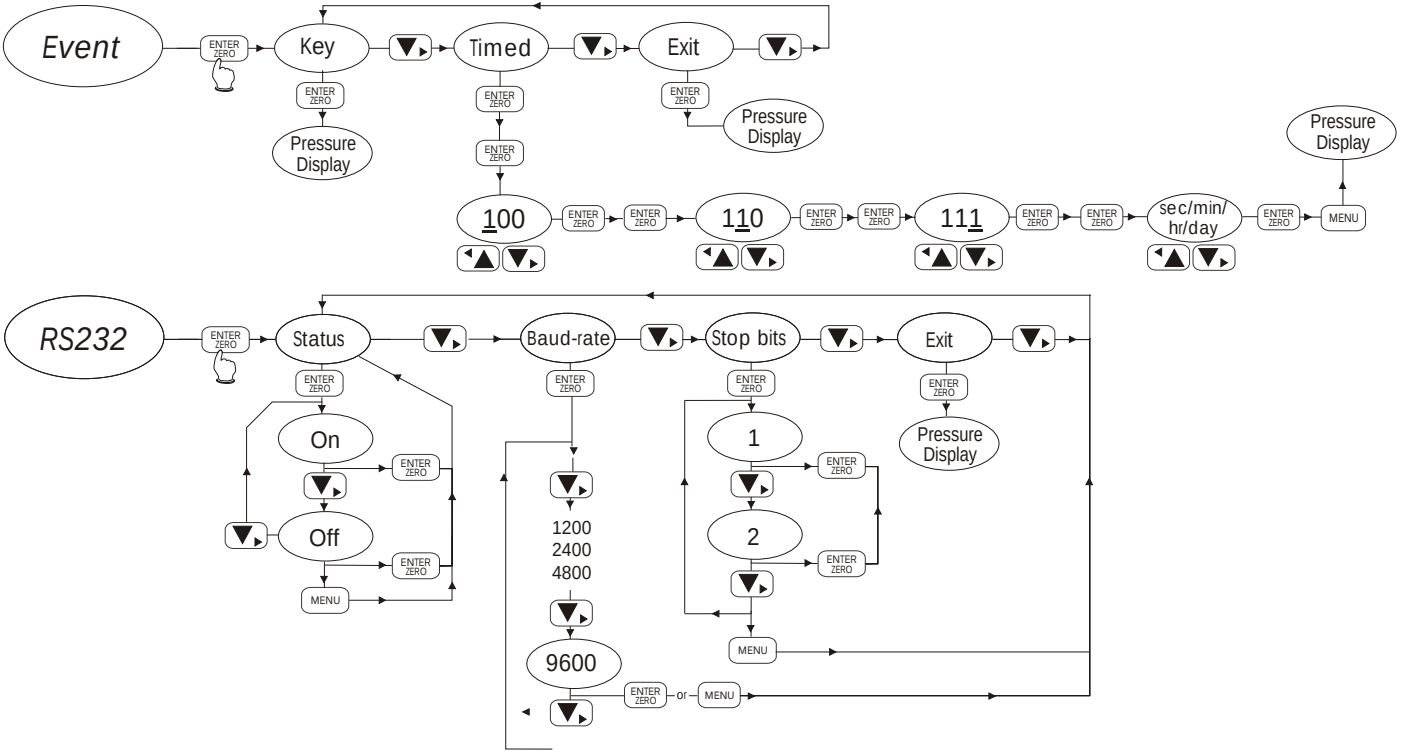


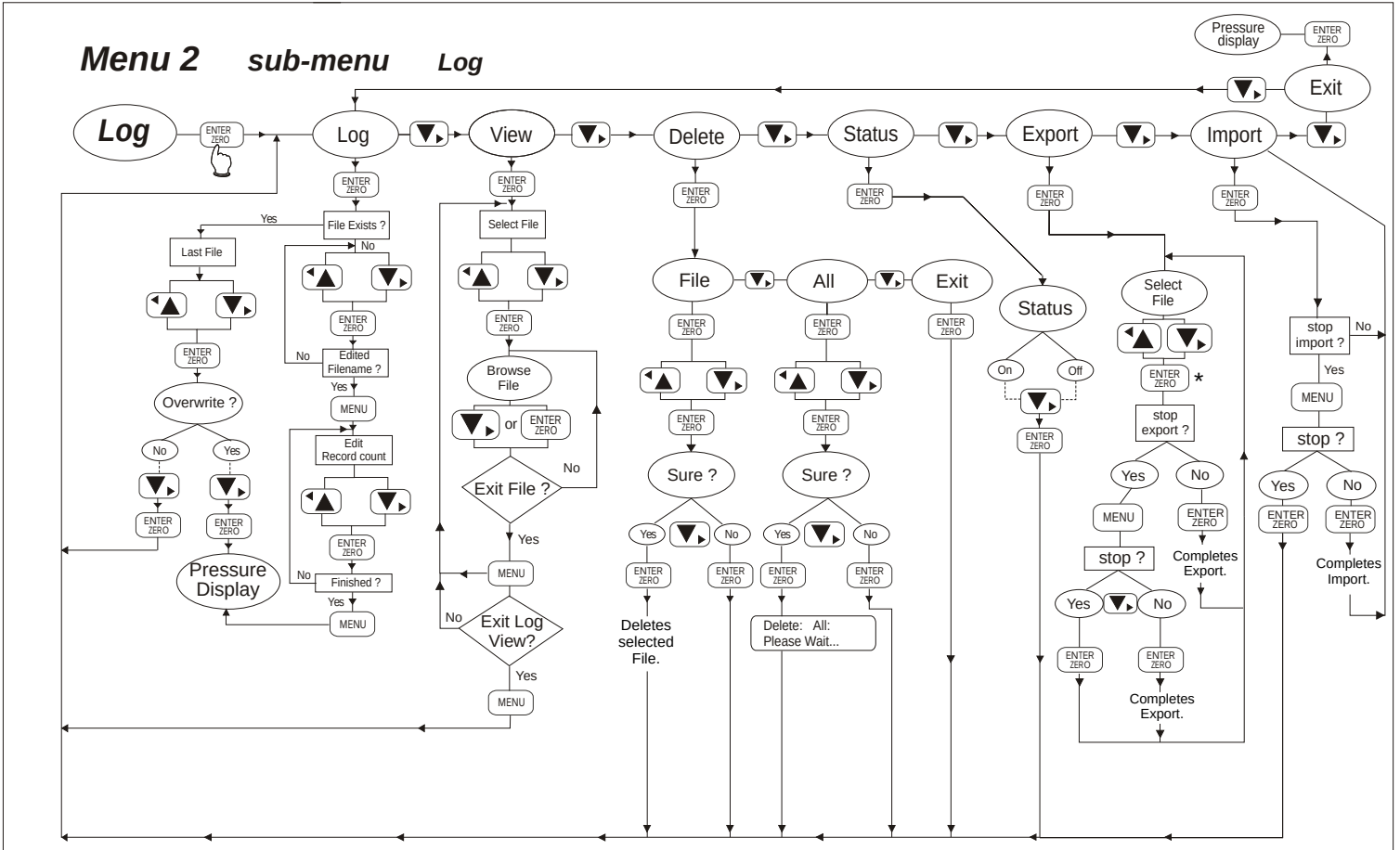
* *Once finished editing press the* MENU *Key to go back to Pressure Display*

Menu 2 *Display light & Resolution*



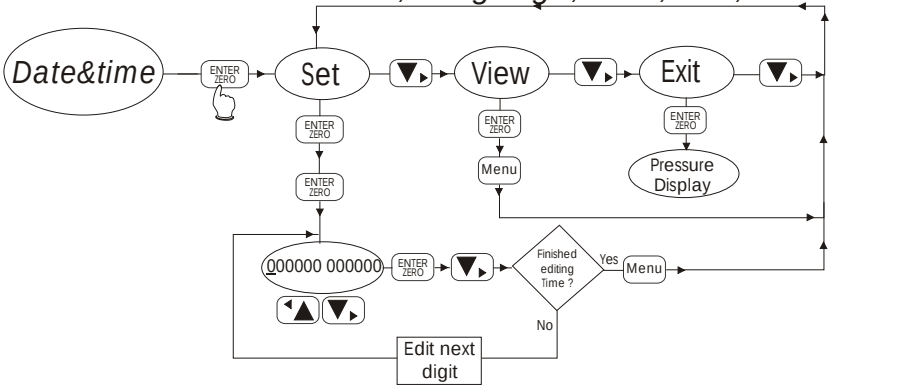
Menu 2 *Event & RS232*

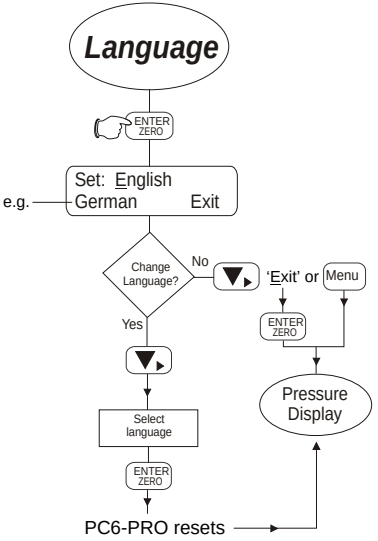


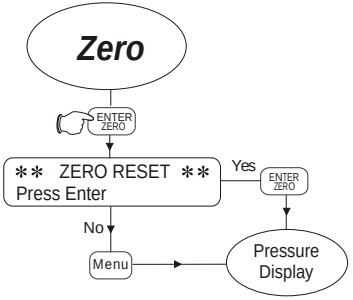


* ENTER ZERO not necessary for file export to 'SiCal PRO'.

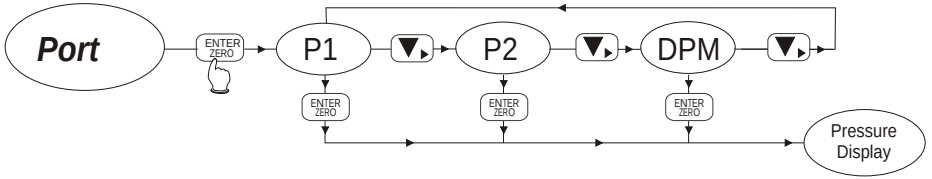
Menu 2 Date&time, Language, Zero, Port, Power off

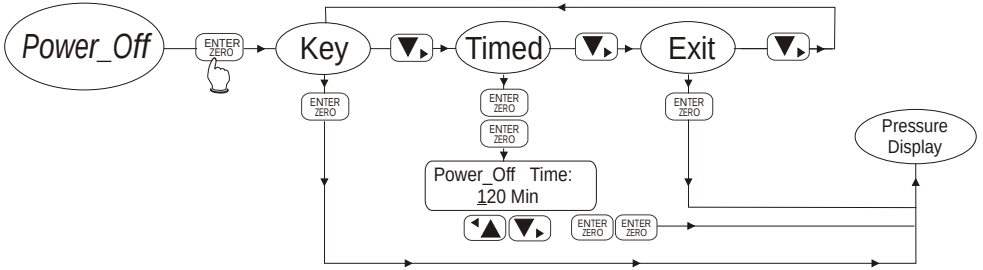




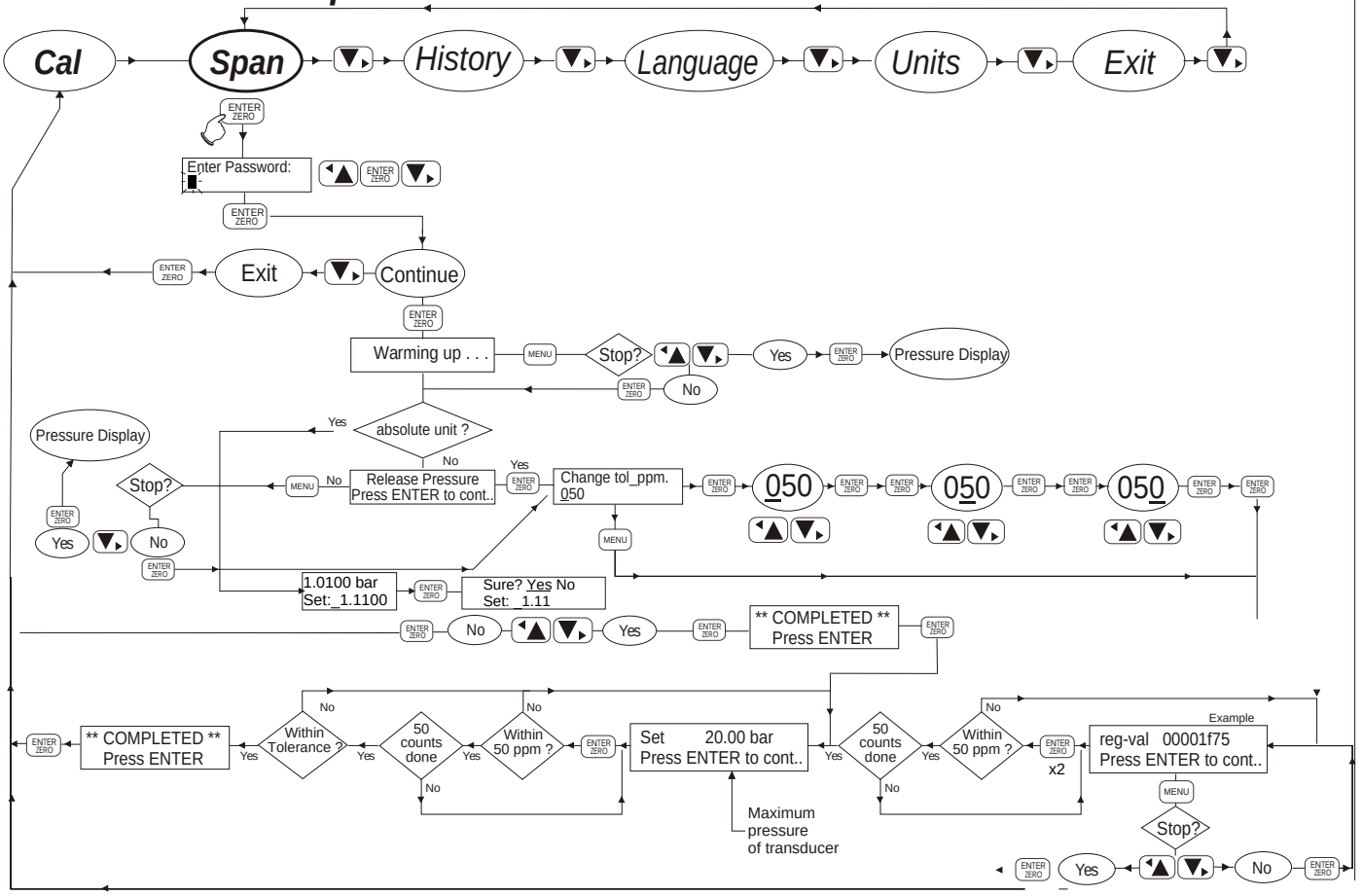


Menu 2 *Date&time, Language, Zero, Port, Power off*

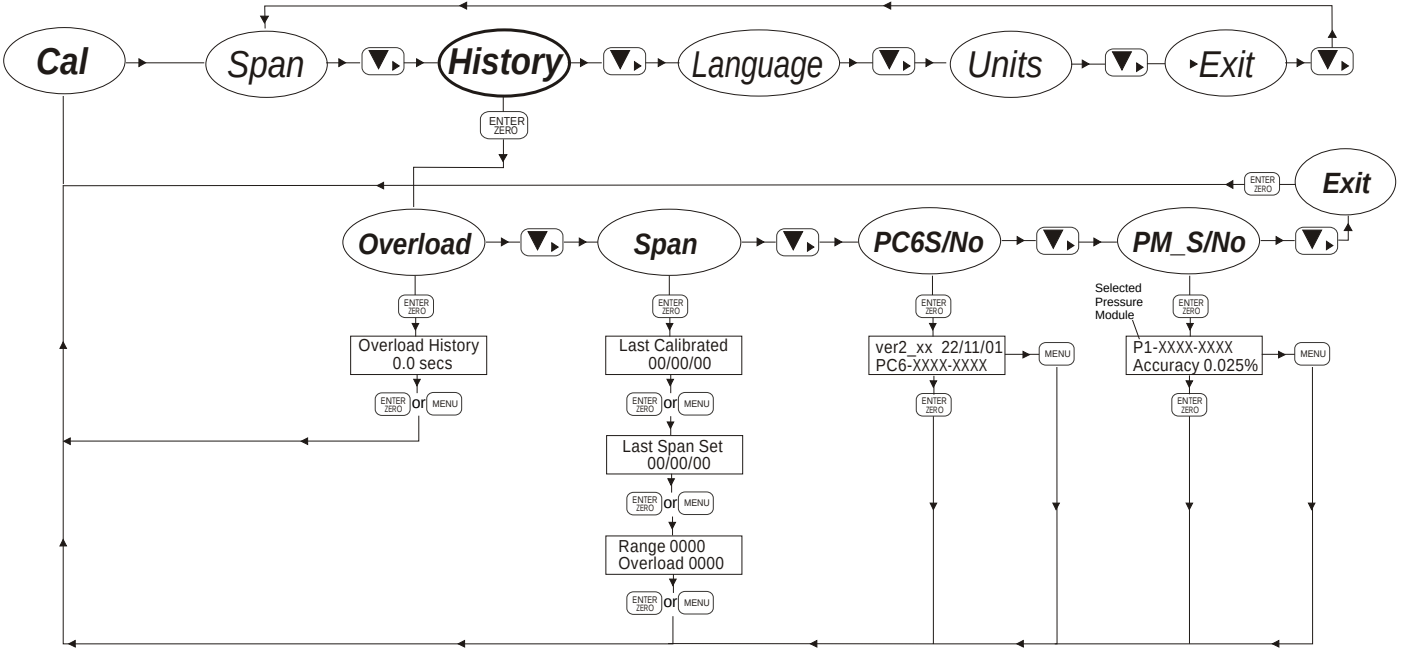




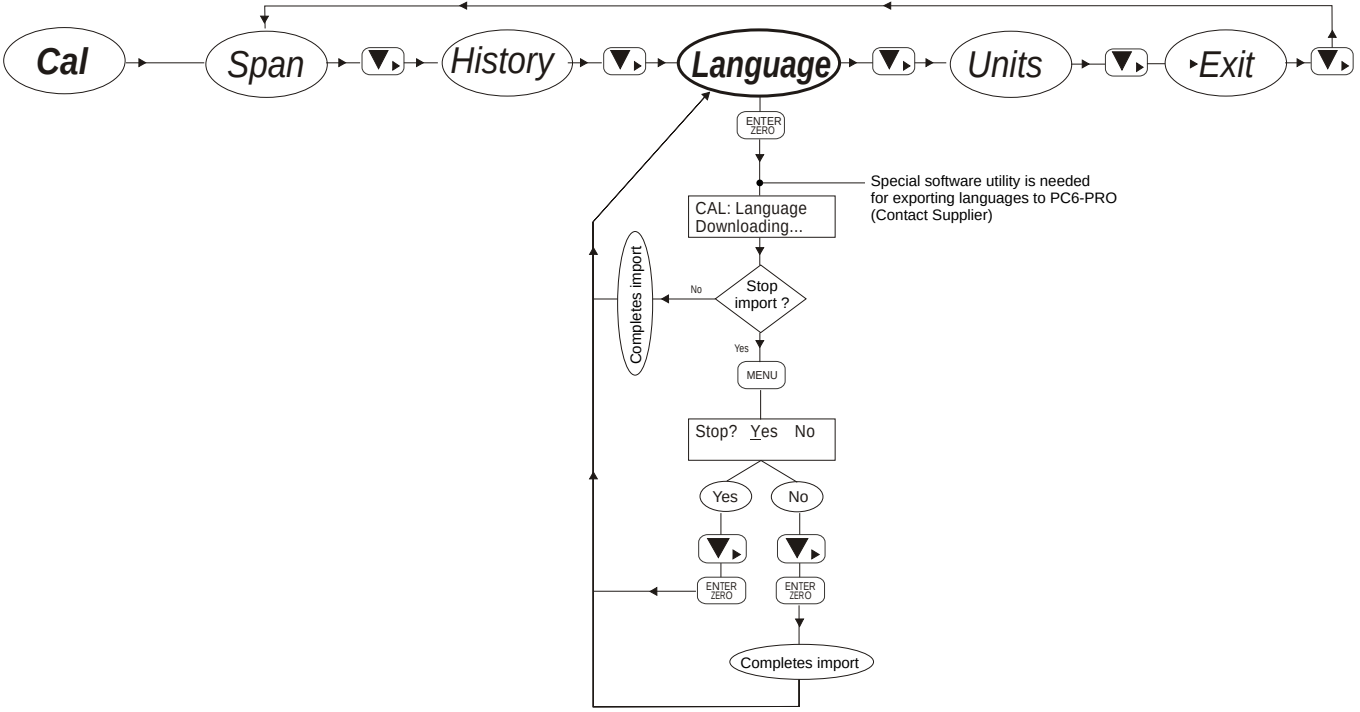
Menu 3 cal-menu Span



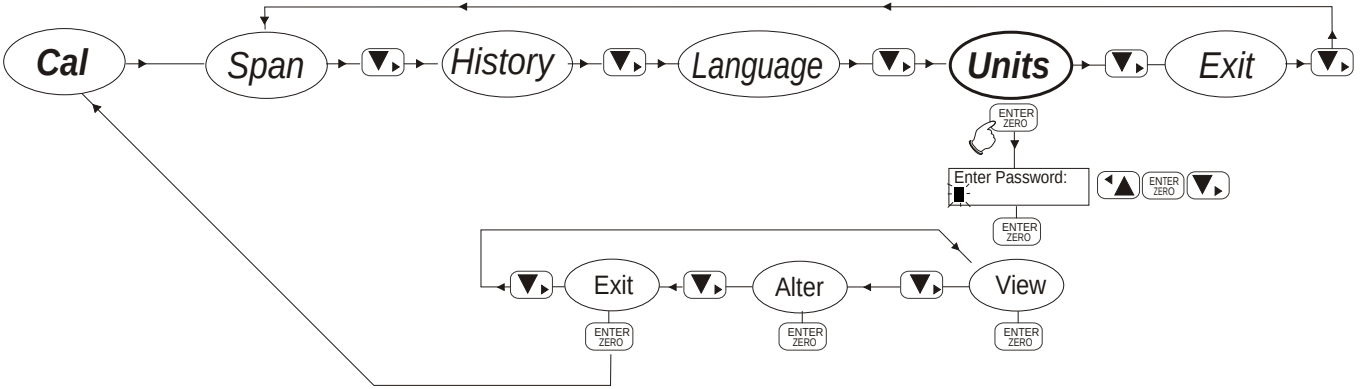
Menu 3 cal-menu History



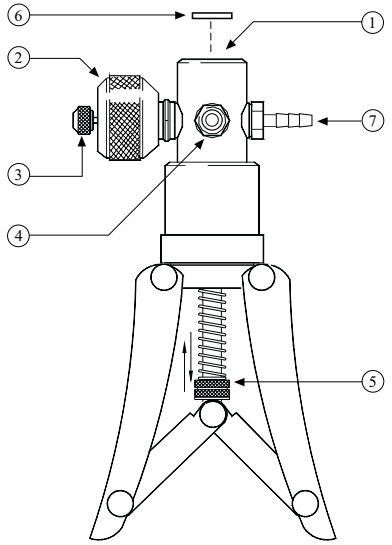
Menu 3 cal-menu Language



Menu 3 cal-menu Units



PRESSURE GENERATION



KEY:

1. Pressure port - 3/8" BSP Parallel female connection to take master instruments e.g. digital or analogue gauge, PC6 Calibrator.
2. Fine adjustment valve.
3. Pressure release valve.
4. Pressure / Vacuum selector
5. Adjustable stroke for varying maximum pressure output (over pressure protection).
6. Nylon seals (see seal kit provided) **DO NOT use 'PTFE' tape for sealing with parallel threads**
7. Pressure port - 8mm

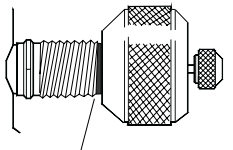
The system is a portable dual source of vacuum and pressure. Each system incorporates a vacuum / pressure selector, a volume control for fine adjustment and adjustable stroke to provide over pressure protection.

RELEASE VALVE (3)
This can be used to reduce or release the pressure in the system. The rate of pressure reduction is dependent upon the degree of rotation when opening the valve. Minimal force is required to seal the system.

VOLUME CONTROL (2)
The pressure generated can be finely adjusted by turning the fine adjustment valve (2) either clockwise or anticlockwise to increase or decrease pressure accordingly.

OVER PRESSURE PROTECTION (5)
To adjust the maximum output pressure of the system turn the nuts (5) to increase or decrease the stroke length.

IMPORTANT
Under no circumstances should the fine adjustment valve (2) be wound back beyond the red line indicator on the body. Should this occur, then the pressure must be released from the system before attempting to re-engage the fine adjustment valve.



PRESSURE/VACUUM SELECTION (4)
Press the selector (4) as indicated on the label to engage the desired mode. Ensure that the release valve (3) is fully closed (clockwise motion) prior to pumping.

NOTE
The system should only be used for pressurising small volumes due to its small displacement.
If the system has not been used for a period of time, it could be difficult to operate on the first stroke.
The cylinder has been lightly greased on assembly but, if additional lubrication should ever be required, then apply a minimal amount to the inside of the cylinder.
Access is via the three retaining screws located under the black collar.

Guidelines for use:

1. Connect item under test to pressure port (7)
2. Screw fine adjustment valve (2) fully clockwise.
3. Screw fine adjustment valve (2) 4 - 6 full turns anticlockwise.
4. Screw pressure release valve (3) fully clockwise, tightening to ensure good seal.
5. Operate handles until the pressure is close to that finally required. **Ensure handles are fully squeezed together on each stroke to achieve maximum pressure output.**
6. Wind the fine adjustment valve (2) clockwise to increase pressure or anticlockwise to decrease pressure until required pressure is reached.
   Note: The pressure may take up to 1 minute to settle after increasing pressure due to thermodynamic effects, settling of seals, etc.

Caution: NEVER screw the fine adjustment valve (2) beyond the red line indicator.

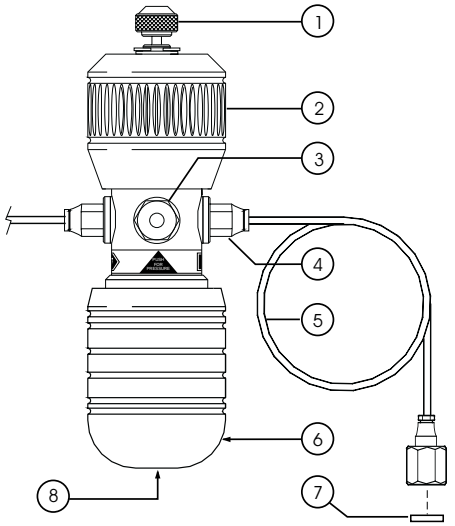
7. Reductions in pressure can also be achieved by careful use of the pressure release valve (3).
8. Vacuum is achieved using the above procedure and having the changeover valve (4) pushed completely towards the vacuum position.

Fault Investigation.

In the event that the system appears to lose pressure then the procedure above should be repeated ensuring new seals are used, adaptors are tightened sufficiently and the pressure release valve (3) is tightened firmly.
Note: The connections to the hand held test system are sealed with 'o' ring or bonded seals and should not leak. The pipe to body connection can be checked but tightened no more than 2 Nm.
DO NOT attempt to tighten the other fittings to the test system as this could lead to damage of sealed joints.
When testing for leaks it may be noticed that air is drawn in or expelled from around the changeover valve. This is normal and should cause no concern.

OPERATING INSTRUCTIONS FOR THE LOW PRESSURE HAND PUMP - LTP1

Key:



1. Pressure release valve.
2. Fine adjustment control.
3. Pressure / Vacuum selector.
4. Two push-fit connectors to take 4mm OD hoses to item under test and master instrument.
5. Two flexible hoses with 1/4"BSP female adaptors to item under test and master instrument.
6. Pump Handle.
7. Nylon seals (see seal kit provided) **DO NOT use 'PTFE' tape for sealing with parallel threads.**
8. Pressure Relief Valve.

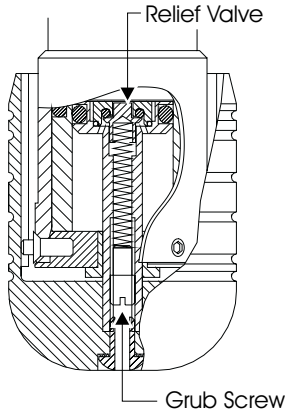
The pump is a portable dual source of vacuum and pressure. Each pump incorporates a vacuum / pressure selector and fine adjustment control.

RELEASE VALVE (1)
This can be used to reduce or release the pressure in the system. The rate of pressure Reduction is dependent upon the degree of rotation when opening the valve. Minimal force is required to seal the system.

FINE ADJUSTMENT CONTROL (2)
The pressure generated can be finely adjusted by turning the fine adjustment control (2) in or out to increase or decrease pressure accordingly.
IMPORTANT
Do not wind the fine adjustment control (2) any further when the top of the pump body is visible.
PRESSURE/VACUUM SELECTION (3)
Press the selector (3) as indicated on the label to engage the desired mode. Ensure that the release valve (1) is fully closed (clockwise motion) prior to pumping.

PRESSURE PORTS (4)
The hoses (5) are fitted by simply pushing them into the connectors (4) until resistance is felt.
To remove the hoses, press the collar in on the connector while pulling on the hose.

PRESSURE RELIEF VALVE (8)
The maximum output pressure can be set using the pressure relief valve located inside the main piston, accessed via the handle retaining screw.



NOTE
The pump should only be used for pressurising small volumes due to its small displacement.
If the pump has not been used for a period of time, it could be difficult to operate on the first stroke.

For seal replacement, refer to service kit LTPK1 instructions.

⚠ **WARNING: DO NOT CONNECT LTP1 TO EXTERNAL PRESSURE SOURCE.**

Guidelines for use:

1. Calibration / Comparison against Analogue gauge

1.1 Connect a Test Gauge to pressure port at the end of one of the flexible hoses (5).

1.2 Connect item under test to the pressure port at the end of the second flexible hose (5) choosing correct adaptors and seals.
Note: Ensure seals are fitted and adaptors tightened to a maximum torque of 15 Nm.

1.3 Screw fine adjustment control (2) in fully and then out 4 - 6 full turns.

1.4 Screw pressure release valve (1) in fully, tightening to ensure good seal.

1.5 Using a small screwdriver, adjust the pressure relief valve (8) to set the desired maximum output pressure. Turn the grub screw located in the main piston clockwise to increase or anti-clockwise to decrease the pressure setting.

1.6 Operate handle (6) until the pressure is close to that finally required.

1.7 Wind the fine adjustment control (2) in to increase pressure or out to decrease pressure until required pressure is reached.
Note: The pressure may settle for up to 30 seconds after increasing pressure due to thermodynamic effects, settling of seals and expansion of the flexible hose.
Caution: STOP unscrewing the fine adjustment control (2) when the top of the pump body becomes visible.

1.8 Reductions in pressure can also be achieved by careful use of the pressure release valve (1).

1.9 Vacuum is achieved using the above procedure and having the pressure / vacuum selector (3) pushed completely towards the vacuum position.

2. Use With High Resolution Pressure Calibrators

When used with instruments such as the PC3 and PC6 Calibrators the connections and use are as for gauges above, however the higher resolution available will amplify the visibility of the thermodynamic effects as mentioned in paragraph 1.7. These will settle to useable values within one minute of pressurisation.
Note: On very high resolutions such as 1 mbar or 0.1 inches of water, small movements of the pipe may result in noticeable pressure changes.

3. Fault Investigation.

In the event that the pump appears to lose pressure then the procedure above should be repeated ensuring new seals are used, adaptors are tightened sufficiently and the pressure release valve (1) is tightened firmly.
Note: The connections to the hand held test system are sealed with 'o' ring or bonded seals and should not leak.
DO NOT attempt to tighten the other fittings to the pump as this could lead to damage of sealed joints.
When testing for leaks it may be noticed that air is drawn in or expelled from around the pressure / vacuum selector. This is normal and should cause no concern.

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