



# CADEANCO

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## **POINT LOAD TEST FRAME**

**MODEL 7000**

## **OPERATING INSTRUCTIONS**

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# Operating Instructions

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## POINT LOAD TEST FRAME

### Version X1.10

The Point Load Strength Index Test is an index for the classification of rock strength. The test can measure the Point Load Strength,  $I_s$ , of rock specimens and the Strength Anisotropy Index,  $I_a$ , which is the ratio of Point Load Strengths in directions of the greatest and least values.

Diametral and axial tests are performed on core samples, while block and irregular lump tests may be carried out on prepared and unprepared samples respectively. Applying load through a pair of uniaxial, conical platens fractures the specimen.

If necessary, size corrections may be applied to core specimens to yield the standard  $I_s(50)$  value which is the  $I_s$  value for a 50mm core. Correlation between  $I_s(50)$  and the Unconfined Compressive Strength have been documented.

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## Description

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The Cadeanco Point Load Tester consists of a two-column anodized aluminium and stainless steel loading frame providing minimum dimensions and weight while maintaining rigidity and load capacity.

Load is applied through a hand operated hydraulic jack mounted on the lower reaction plate. Close tolerance bushes guide the travel of the bottom platen on the guide shafts while platen separation is measured by a sliding scale with an adjustable datum. The platen points contain hardened steel balls to provide a true 5mm radius.

The applied load is measured via a strain-gauged upper point and displayed on an intelligent liquid crystal display. This display also allows the operator to select the Point Load Tester functions through its front panel keys. Alternatively, a computer can run a custom software package to record test data. Peak test values are shown on both the local display and the computer monitor.

A battery life of at least fifteen hours ensures prolonged field or laboratory testing and the frame can be run with mains power connected if available. A transparent safety screen protects the operator from rock fragments during the test.

The testing frame can be supported by holding the lifting handle while loading the sample. If possible, the unit should be anchored to a suitable mounting base with the supplied mounting brackets fitted to the tapped holes in the base of the jack.

## Operating Environment

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The Point Load Tester frame is designed as a robust field instrument however it is not intended to be waterproof. The front and rear panels are fitted with sealing gaskets however care should be taken to keep the display housing as dry and dust free as possible. If the instrument is exposed to water, remove the front panel and remove any visible water at the earliest opportunity. Dry the rear of the LCD module and the inside of the electronics housing using a domestic hair dryer set to its lowest heat setting. Ensure that no condensation is present when replacing the front panel.

# Frame Functions

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The Point Load Tester readout has a custom microcomputer measurement and control system that is accessed through the front panel keys. Functions are available on a circular menu structure which steps to the next function after two seconds or can be advanced more quickly by use of the [MENU] key. The user selects an operating function by pressing the [SELECT] key and continues to advance through the stages of any particular function by pressing the [SELECT] key. A selected function can be aborted at any time by pressing the [MENU] key that returns the display to the PEAK HOLD MODE menu item.

## MENU STRUCTURE

The Point Load Tester readout has three methods of operation as shown in the diagram of the menu structure attached as APPENDIX A.

The frame is turned on by pressing the [MENU] key once to display the SIGN-ON message that contains the manufacturers name, internal software version and serial number for that particular frame. The menu loop is entered by pressing the [MENU] key a second time and the readout will cycle through the three modes available for NORMAL operation.

Computer mode should be selected prior to operating the frame from the custom Windows software supplied as an accessory with the PLT Frame.

Bluetooth Mode will allow all the frame functions to be accessed via custom mobile applications for both IOS and Android hardware.

The readout has two further modes that can be added to the menu structure to allow the user to recover peak load data and to configure the readout display parameters to suit the operators' preferences. These EXTENDED modes are accessed by holding the [MENU] key down for at least 2 seconds while powering the readout.

## PEAK HOLD FUNCTION

This is the usual function for testing core samples. The function is accessed by pressing the [SELECT] key and the display indicates that the measurement system is ready to take its auto-zero measurement.

**It is critical that there is no load on the conical points at this stage as the value recorded when stepping to the peak hold measurement function will be automatically subtracted from all subsequent load measurements.**

The display will indicate the maximum load value attained during the test so that spalling etc. of the sample can be ignored by the operator. The peak value will continue to be displayed until the system is returned to the main menu loop by pressing the [MENU] key. At this point the peak value will be saved to internal memory for retrieval by the RECALL mode function.

## TRACK FUNCTION

This function is provided for testing samples where the user wishes to observe the plastic nature of a sample. The function is accessed by pressing the [SELECT] key and the display indicates that the measurement system is ready to take its auto-zero measurement.

**It is critical that there is no load on the conical points at this stage as the value recorded when stepping to the track load measurement function will be automatically subtracted from all subsequent load measurements.**

The display will indicate the current load value during the test. The current load value will continue to be displayed until the system is returned to the main menu loop by pressing the [MENU] key.

## POWER-OFF FUNCTION

This function is used to turn off power to the system by pressing the [SELECT] key.

## COMPUTER MODE FUNCTION

The Computer Mode function is used to allow the frame to be controlled remotely from custom software when a serial communications cable is connected to the 4-pin port at the rear of the frame. In this case the menu system is accessed via the remote computer. Details of each test may be recorded and saved as a text file that can be readily imported into standard spreadsheet applications for later analysis.

## BLUETOOTH MODE FUNCTION

The Bluetooth Mode function is used to allow the frame to be controlled remotely from on any device running Cadeanco's custom application. The menu system is accessed via the remote device. Details of each test may be recorded and saved as a text file that can be readily imported into standard spreadsheet applications for later analysis.

A custom application for Android platforms is available as an optional accessory. A ruggedized Samsung tablet is also available pre-loaded with the custom application.

## RECALL FUNCTION

If the operator has configured the readout to automatically shut down, it is possible that a peak load value could be lost if the user forgets to manually record the reading. The recall mode allows the last five peak load values to be recovered by pressing the **[SELECT]** key after entering the RECALL mode. The latest value is recorded as Peak P1 and the earliest as Peak P5.

## CONFIGURE FUNCTION

This function is used to customise the operation of the readout system to suit individual operators. Four parameters are displayed in a sub-menu loop and each can be individually configured by pressing the **[SELECT]** key to choose how it will affect the operation of the load measurement system. The **[MENU]** key can be used at any time to save the configuration and return to the main menu loop.

- Display Units? The readout can display all values in kilo-Newton (kN) or pounds-force (lbf) units.
- Auto-off? The operator can select if the readout is to power itself down after it cycles through the menu structure 10 times. The auto-off feature is also disabled when the auto-scroll parameter is disabled.
- PC Close? This parameter is enabled to allow the frame to be powered down when the operator closes the custom software available for remote control of the frame.
- Auto-scroll? The displayed operating modes will advance automatically every 2 seconds if this parameter is enabled. The menu can be advanced by pressing the **[MENU]** key if automatic scrolling is not required.

## Battery Low Indication

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When the battery has fallen below the factory set level a warning message [**Battery is low**] will appear in the display and the measurement system will shut down automatically. The point load tester will shut down before the accuracy of the measurement system is affected however it is recommended that recharging take place immediately using the supplied 240V AC power module connected to the DC input plug at the rear of the frame. The unit will fully recharge in 24 hours although this will take longer if the unit is left powered during the recharge period. Battery charging for prolonged periods will not harm the measurement system however the charge storage capacity of the Ni-Mh batteries may be reduced through over-charging.



# Peak Hold Sample Testing

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1. Press **[MENU]** and observe that the sign-on display is shown.
2. Press **[MENU]** and the display will cycle through the available function menus.
3. When the PEAK HOLD function is displayed press the **[SELECT]** key.
4. Ensure that there is no load on the upper point and press **[SELECT]** to zero the measurement system.
5. Place a sample on the support bracket to ensure a full diameter between the loading points.
6. Use the jack handle to close the ram valve clockwise.
7. Bring the points into contact with the sample using the jack.
8. Record the core diameter from the scale of point separation.
9. Load the sample with even strokes to fail the sample over 10-15 seconds, avoiding dynamic failures caused by the loading rate. Slow even loading is especially important for samples that fail below 5kN to ensure that reliable and accurate data is obtained. If the sample 'spalls' during the test, release the ram and reposition the sample between the points and reload core. The measurement system will only update if the original peak load value is exceeded.
10. Record the displayed reading at failure and reset the display by pressing **[MENU]** to return to the main menu loop.
11. Release the ram by turning the valve anti-clockwise and remove all rock fragments.

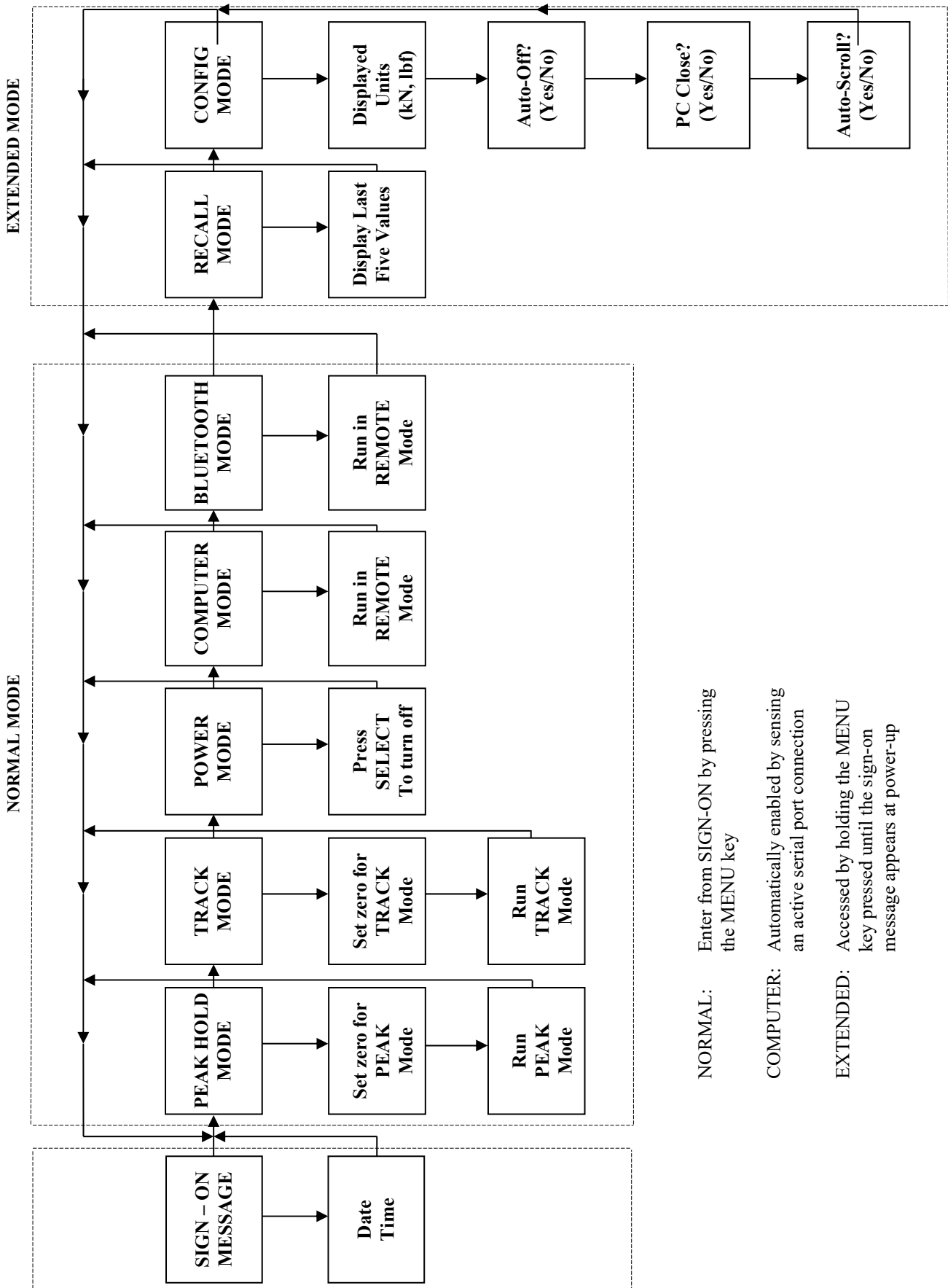
# Specifications

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<b>LOAD CELL</b>	Range:	2-50kN
	Accuracy:	Better than $\pm 0.2\%$
	Temperature:	0-50°C
<b>PLATENS</b>	Stainless steel with hardened stainless steel ball inserts	
	Separation:	76mm maximum
<b>HYDRAULIC JACK</b>	Capacity:	67kN
	Stroke:	76mm
<b>POWER</b>	Battery:	Ni-MH Battery pack
	Life:	15 hours minimum
	Charge Period:	14 hours from flat
<b>BLUETOOTH®</b>	Range	5mt
	Interface	Custom apps for both IOS and Android platforms.
<b>FRONT PANEL</b>	Display:	2 x 16 Character High Contrast Green OLED
	Functions:	Peak Hold Mode
		Track Mode
		Computer Mode
		Bluetooth® Mode
<b>DIMENSIONS</b>	Instrument:	491H x 219W x 180D
	Carry Case:	550H x 345W x 250D
<b>WEIGHT</b>	Instrument:	14.1kg
	Carry Case:	6.9kg

*Cadeanco is continually improving its products and processes and as such information contained in this document is subject to change without notice.*

# Appendix A



**NORMAL:** Enter from SIGN-ON by pressing the MENU key

**COMPUTER:** Automatically enabled by sensing an active serial port connection

**EXTENDED:** Accessed by holding the MENU key pressed until the sign-on message appears at power-up