



Time Electronics
Calibration, Test and Measurement

User Manual

XTEG Pressure Measurement Modules

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This also applies to any schematics, drawings and diagrams contained herein.

This manual provides operating and safety instructions for the Time Electronics product.

To ensure correct operation and safety, please follow the instructions in this manual.

Time Electronics reserves the right to change the contents, specifications and other information contained in this manual without notice.

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1 Introduction



1.1 Description

The XTEG range of modules provide users with high accuracy pressure measurement on the Time Electronics CalBench. They feature internal communication to a control centre (standard with 8060 or 7051) and operation is via a dedicated application or EasyCal software. The user interface displays pressure readback allowing the XTEG to be utilised as the master reference standard in various testing applications for instrumentation such as gauges and transmitters.

Pressure input connection is straightforward with a minimes port (quick release for lower ranges and differential) situated on the front of the module. Pressure ranges are from vacuum to 700 bar (10,000 psi), with gauge, compound, absolute and differential versions available. Basic accuracy is 0.02 % of full scale, with 5-digit resolution.

The modules can be used for pneumatic or hydraulic calibration work and are suitable for use with the Time Electronics range of benchtop pressure pumps. These include the pneumatic 7194A (vacuum to 200 bar), and hydraulic 7195 (vacuum to 700 bar) that provide users with a convenient method of pressure generation on the CalBench.

XTEG modules can be configured as single, double or triple measurement versions. This means that up to three sensors can be positioned in one compact 50 mm wide module, making them suitable for use in CalBenches where space is a minimum due to a certain selection of modules. XTEG modules can be used with Time Electronics EasyCal software to automate the calibration process. This provides increased speed of calibration and consistency of results. Produce traceable calibration certificates and test reports for quality standards with additional uncertainty information for ISO 17025 conformance.

1.2 Features

- CalBench pressure measurement modules
- Readback via Control Centre Module
- Gauge, Compound and Differential types
- Vacuum to 700bar (10,000psi) versions
- For pneumatic or hydraulic calibration
- 0.02% FS standard accuracy
- Selectable resolution depending on sensor range
- Multi sensor module versions available
- EasyCal software compatible

2 Specifications

2.1 General Specifications

Ranges	Vacuum to 700 bar. See page 2 for available modules and ranges.
Pressure types	Gauge / Absolute / Compound / Differential.
Accuracy	0.02 or 0.05 % FS. See page 2 for further details.
Pressure units	Total of 5 on screen. Units displayed depend on XTEG pressure range. Pa, kPa MPa, Kg/cm ² , mmH2O, inH2O, mmHg, inHg, PSI, mbar, bar.
Over pressure warning	120 %.
Measure speed	Display rate: 3 readings per second (default setting). Adjustable from 10 readings per second to 1 reading every ten seconds.
Display	Pressure Control centre Interface or EasyCal software (optional)
Resolution	5 digits typical. Varies depending on sensor range. Resolution is selectable from control interface.
Pressure port	Minimess test point with check valve. Hoses supplied, and configured to work with ordered manifolds or pumps. Quick release for DP modules.
Environmental	Operating temperature: -10 °C to 50 °C (14 °F to 122 °F). Compensation temperature: -10 °C to 50 °C (14 °F to 122 °F). Storage temperature: -20 °C to 70 °C (-4 °F to 158 °F). Relative humidity: < 95 %.
Module width	50 mm (primary or secondary console fitting).

2.2 Pressure Ranges

Gauge Pressure Modules

Media: Gas only from vac to 700mbar. Gas or Liquid from 1 bar to 700 bar. Note:
0.02% FS for gas media only on 1bar and 2 bar modules

Burst Pressure: Vac to 350 bar = 3x. 600 to 700 bar = 2x.

Module	Range (bar)	Range (psi)	Accuracy (% FS)
XTEG-GVAC	-1 to 0 bar	-15 to 0 psi	0.02
XTEG-G160mb	0 to 160 mbar	0 to 2 psi	0.05
XTEG-G350mb	0 to 350 mbar	0 to 5 psi	0.02
XTEG-G700mb	0 to 700 mbar	0 to 10 psi	0.02
XTEG-G1b	0 to 1 bar	0 to 15 psi	0.02
XTEG-G2b	0 to 2 bar	0 to 30 psi	0.02
XTEG-G3.5b	0 to 3.5 bar	0 to 50 psi	0.02
XTEG-G5b	0 to 5 bar	0 to 70 psi	0.02
XTEG-G7b	0 to 7 bar	0 to 100 psi	0.02
XTEG-G10b	0 to 10 bar	0 to 150 psi	0.02
XTEG-G20b	0 to 20 bar	0 to 300 psi	0.02
XTEG-G35b	0 to 35 bar	0 to 500 psi	0.02
XTEG-G40b	0 to 40 bar	0 to 600 psi	0.02
XTEG-G60b	0 to 60 bar	0 to 870 psi	0.02
XTEG-G70b	0 to 70 bar	0 to 1000 psi	0.02
XTEG-G100b	0 to 100 bar	0 to 1500 psi	0.02
XTEG-G140b	0 to 140 bar	0 to 2000 psi	0.02
XTEG-G160b	0 to 160 bar	0 to 2320 psi	0.02
XTEG-G200b	0 to 200 bar	0 to 3000 psi	0.02
XTEG-G250b	0 to 250 bar	0 to 3625 psi	0.02
XTEG-G300b	0 to 300 bar	0 to 4350 psi	0.02
XTEG-G350b	0 to 350 bar	0 to 5000 psi	0.02
XTEG-G600b	0 to 600 bar	0 to 8700 psi	0.02
XTEG-G700b	0 to 700 bar	0 to 10,000 psi	0.02

Barometric Pressure Module

Module	Range (mbar)	Range (kPa)	Accuracy	
XTEG-BP	600 to 1100 kPa	60 to 110	0.4 mbar	40 Pa

Differential Pressure Modules

Media = Gas.

Burst Pressure: 2.5 & 5 mb: 100x. 10 mb: 50x. 25 to 75 mb: 20x. 160 to 700 mb: 3x.

Model #	Range (mbar)	Range (inH ₂ O)	Accuracy (% FS)
TEG-DP2.5mb	0 to ± 2.5 mbar	0 to ± 1 inH ₂ O	0.05
TEG-DP5mb	0 to ± 5 mbar	0 to ± 2 inH ₂ O	0.05
TEG-DP10mb	0 to ± 10 mbar	0 to ± 4 inH ₂ O	0.05
TEG-DP25mb	0 to ± 25 mbar	0 to ± 10 inH ₂ O	0.05
TEG-DP50mb	0 to ± 50 mbar	0 to ± 20 inH ₂ O	0.05
TEG-DP75mb	0 to ± 75 mbar	0 to ± 30 inH ₂ O	0.05
TEG-DP160mb	0 to ± 160 mbar	0 to ± 50 inH ₂ O	0.05
TEG-DP350mb	0 to ± 350 mbar	0 to ± 150 inH ₂ O	0.02
TEG-DP700mb	0 to ± 700 mbar	0 to ± 300 inH ₂ O	0.02

Absolute Pressure Modules

Media = Gas only from 350 mbar to 3.5 bar. Gas or Liquid from 7 bar to 350 bar.

Burst Pressure: 3x on all ranges.

Module	Range (bar)	Range (psi)	Accuracy (% FS)
XTEG-A350mb	0 to 350 mbar	0 to 5 psi	0.1
XTEG-A700mb	0 to 700 mbar	0 to 10 psi	0.1
XTEG-A1b	0 to 1 bar	0 to 15 psi	0.1
XTEG-A2b	0 to 2 bar	0 to 30 psi	0.1
XTEG-A3.5b	0 to 3.5 bar	0 to 50 psi	0.1
XTEG-A7b	0 to 7 bar	0 to 100 psi	0.05
XTEG-A10b	0 to 10 bar	0 to 150 psi	0.05
XTEG-A20b	0 to 20 bar	0 to 300 psi	0.05
XTEG-A35b	0 to 35 bar	0 to 500 psi	0.05
XTEG-A70b	0 to 70 bar	0 to 1000 psi	0.05
XTEG-A100b	0 to 100 bar	0 to 1500 psi	0.05
XTEG-A200b	0 to 200 bar	0 to 3000 psi	0.05
XTEG-A350b	0 to 350 bar	0 to 5000 psi	0.05

2.2.1 Compound Pressure Modules

Media = Gas. Burst Pressure: 3x

Module	Range (bar)	Range (psi)	Accuracy (% FS)	
XTEG-C160mb	0 to ± 160 mbar	0 to ± 2 psi	0.02	0.05
XTEG-C350mb	0 to ± 350 mbar	0 to ± 5 psi	0.02	0.05
XTEG-C400mb	0 to ± 400 mbar	0 to ± 6 psi	0.02	0.05
XTEG-C600mb	0 to ± 600 mbar	0 to ± 9 psi	0.02	0.05
XTEG-C700mb	0 to ± 700 mbar	0 to ± 10 psi	0.02	0.05
XTEG-C1b	0 to ± 1 bar	0 to ± 15 psi	0.02	0.05
XTEG-CV2b	-1 to 2 bar	-15 to 30 psi	0.02	0.05
XTEG-CV4b	-1 to 4 bar	-15 to 60 psi	0.02	0.05
XTEG-CV5b	-1 to 5 bar	-15 to 70 psi	0.02	0.05
XTEG-CV6b	-1 to 6 bar	-15 to 87 psi	0.02	0.05
XTEG-CV7b	-1 to 7 bar	-15 to 100 psi	0.02	0.05
XTEG-CV10b	-1 to 10 bar	-15 to 150 psi	0.02	0.05
XTEG-CV20b	-1 to 20 bar	-15 to 300 psi	0.02	0.05
XTEG-CV25b	-1 to 25 bar	-15 to 360 psi	0.02	0.05
XTEG-CV40b	-1 to 40 bar	-15 to 600 psi	0.02	0.05

3 Safety Notices



User Responsibilities

- a) The user should ensure that all local safety requirements are met when using compressed gas or hydraulic line pressures.
- b) High pressures systems should only be assembled and operated by users who are fully trained and understand the potential hazards which are associated with hydraulics and pneumatics.
- c) All connection made to the UUT or the XTEG module should be sufficient for the maximum pressure that could be supplied from the pressure source.
- d) "Personal Protective Equipment" (PPE) eye protection should be used when using pressure devices.



Line Pressure and Supplies

Calibration pressure to the XTEG modules can be applied via a manual pump or by a compressed and regulated supply such as an RMTEG or 8030B CalBench module. When a compressed supply is used, operators should consider the below:

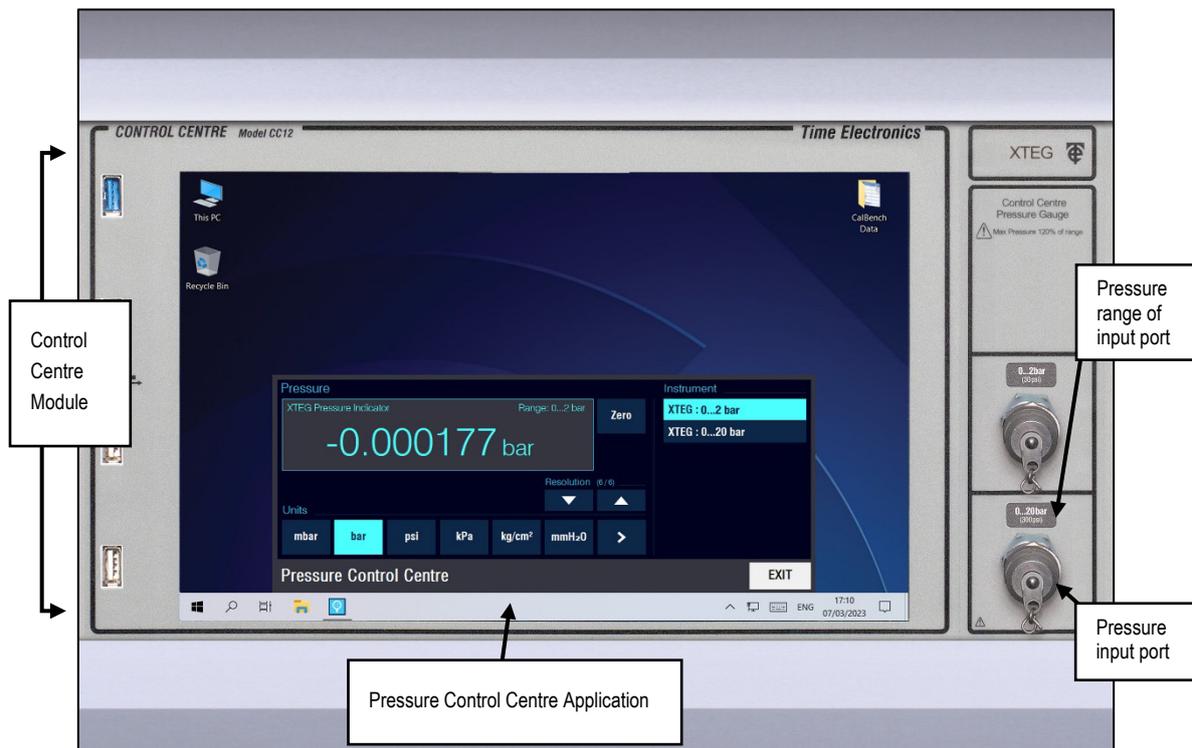
- a) Air Compressors should be regularly serviced and produce the quality of air required for the application.
- b) Ensure the compressed supply quality is clean and dry by the use of water traps at either the outlet of the compressor or prior to the input of the bench. These should be empty on a regular basis; failure to supply clean dry gas may render the warranty void.
- c) Gas cylinders should be mounted either on a trolley or chained to the wall or as local law dictates.
- d) Hoses connected to the compressor or cylinder should be inspected on a regular basis and should be replaced if any damage is observed during the inspection.
- e) Hose connections must be of the correct rating and size for the applied pressure.
- f) All external pressure connection should be inspected on a regular basis to ensure a leak free joint.
- g) Ensure that regulated output is within a suitable pressure range for the XTEG range.

4 Operation

4.1 Overview

XTEG modules can be configured as single, double or triple pressure measurement versions. For each pressure measurement there is an input port connection marked with the corresponding full scale range.

The XTEG pressure measurement readings are displayed via a manual application called 'Pressure Control Centre', or optionally readings can be used as part of an automated calibration procedure using Time Electronics EasyCal software.



4.2 Pressure input connection

XTEG modules can be configured as single, double or triple measurement versions. For each pressure measurement there is an input port connection marked with the corresponding full scale range.

XTEG the input connection is via a minimes fitting. XTEG-DP differential modules have quick release type fittings and feature 2 ports (+Hi and -Lo).



Operation Cautions:

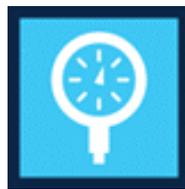
To prevent sensor damage, do not allow the pressure input to exceed 120% of range. Connect the measurement port to the test pressure by using fittings and hose suitable for the pressure range.

4.3 Pressure Control Centre

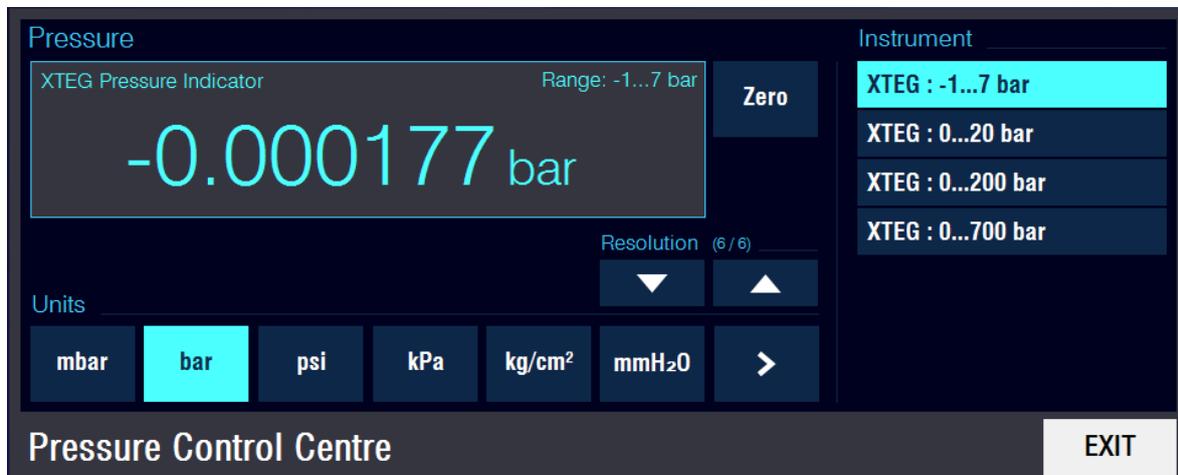
The XTEG pressure measurement readings are displayed via a manual application called 'Pressure Control Centre', or optionally readings can be used as part of an automated calibration procedure using Time Electronics EasyCal software.

For more information on setting up the XTEG for use with EasyCal see section 5: EasyCal configuration. For CalBenches supplied by Time Electronics as a package which includes EasyCal, the XTEG EasyCal system setup will be already done as standard.

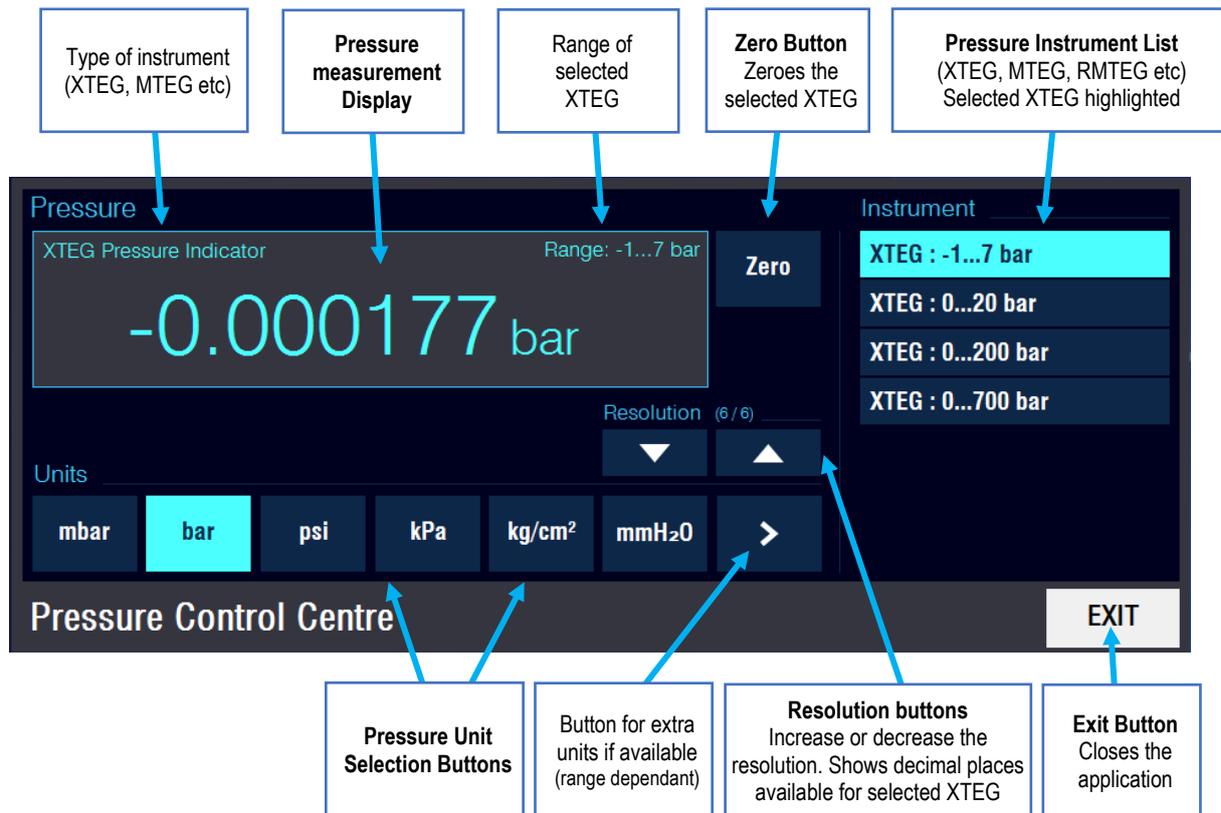
To start the manual application simply touch the Pressure CC tile found on the windows start menu:



And the Pressure Control Centre will start:

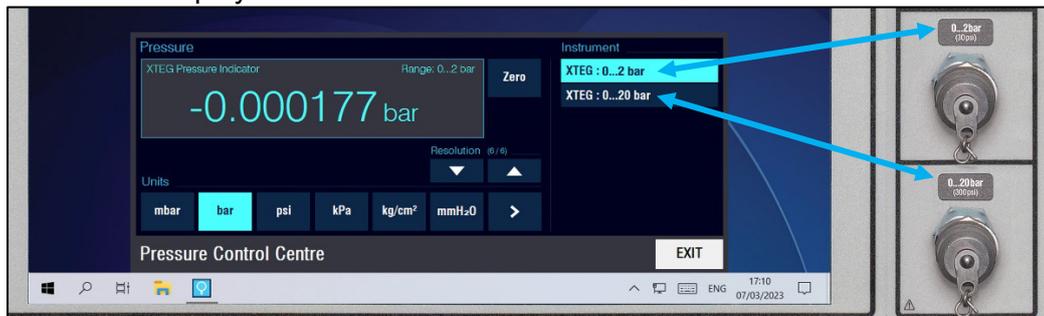


4.4 Control Interface Operation



To view a pressure measurement; follow these steps:

1. Select the pressure instrument and port range from the Pressure Instrument list. The list will display the available instruments in the CalBench.



2. Touch the required units button for measurement.
3. Adjust the resolution to the preferred digit display for the application.
4. Connect a pressure source to the XTEG port and apply pressure.

For gauge measurements the reading should be zeroed before performing measurements:

1. Vent the input of the pressure port to atmospheric pressure.
2. Ensure the reading is settled to near zero.
3. Press the zero button to reset the instrument to zero.

4.5 Using the XTEG to perform calibrations

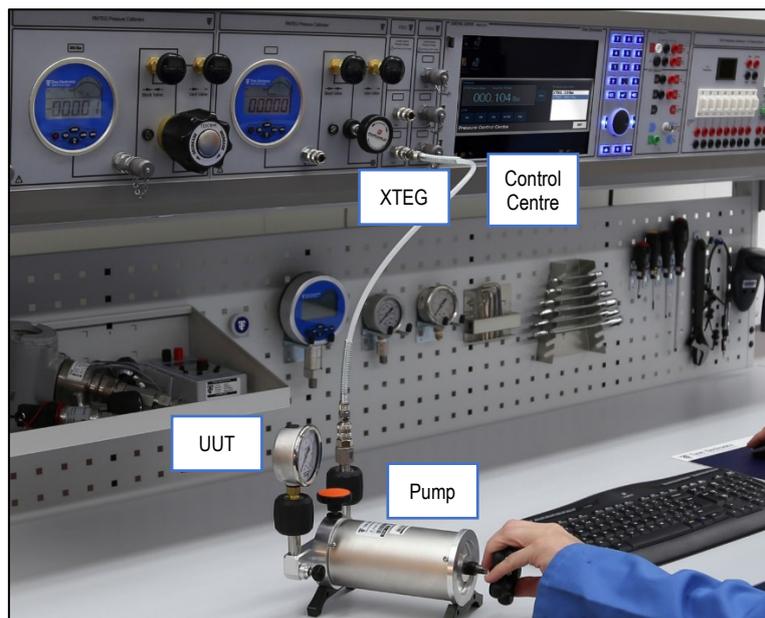
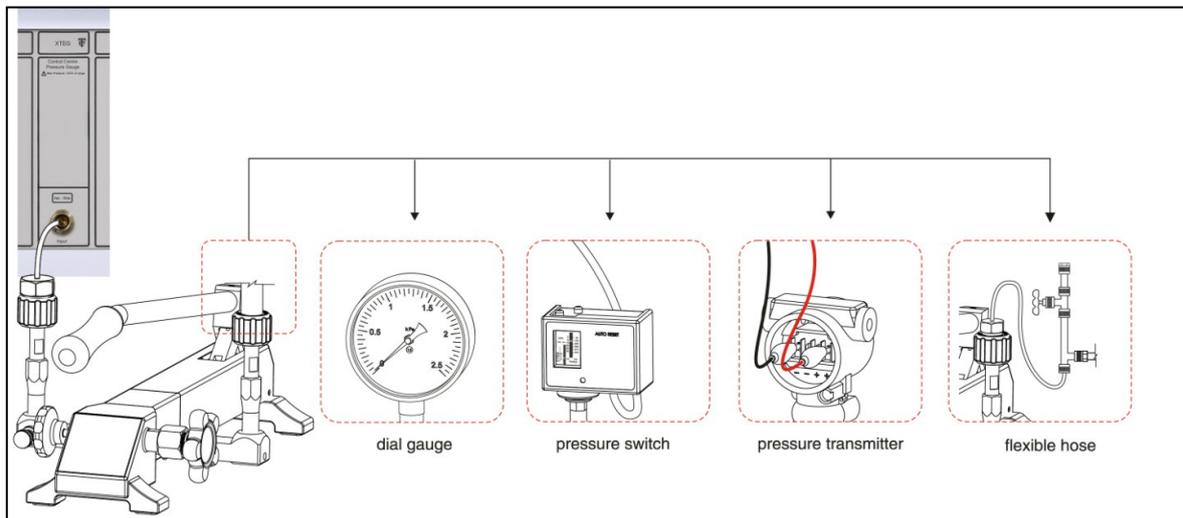
The XTEG pressure measurement module is a precision pressure indicator designed for use in calibration as a 'master reference' instrument. To perform pressure calibrations with units under test (UUT) it is expected that a test pressure be applied to the XTEG and the UUT. The reading on the XTEG and the UUT is then compared to find the error (difference) on the UUT compared to the master XTEG.

The test pressure used can be generated using a number of methods:

- Manual hand or desktop pump
- Regulated compressed air from an electric pump or compressed gas bottle

4.5.1 Using a manual pump

To use the XTEG with a pump, connect as shown below:



Time Electronics offer a range of pressure calibration pumps that are suitable for use with XTEG modules. Listed below are the pumps:

7090	Pneumatic Hand Pump Kit (-950mbar to 40bar) with hoses, fittings, case
7095	Hydraulic Hand Pump Kit (0 to 700bar) with hoses, fittings, case
7117	Handheld Vacuum Calibration Pump (0 to 950 mbar Absolute)
7118	Handheld Pressure Calibration Pump (0 to 7bar)
7119	Low Volume Pressure Chamber (vacuum to 5.5bar)
7190*	Micro-Pressure Benchtop Pump (0 to +/-0.4 bar)
7191*	Pneumatic Benchtop Pump (vac to 4bar)
7192*	Pneumatic Benchtop Pump (vac to 25bar)
7193*	Pneumatic Benchtop Pump (vac to 40bar)
7193A*	Benchtop Pneumatic Pressure Calibration Pump (vacuum to 70bar)
7193B*	Benchtop Pneumatic High Pressure Calibration Pump (vacuum to 100bar)
7194*	Benchtop Pneumatic Pump (0.95bar vacuum to 140bar)
7194A*	Benchtop Pneumatic High Pressure Calibration Pump (vacuum to 200bar)
7195*	Benchtop Hydraulic Pump (0.9bar vacuum to 700bar)
7195LP*	Benchtop Hydraulic Pressure Calibration Pump (vacuum to 400bar)

** Benchtop pumps that feature a dual manifold. These pumps are recommended for use with the XTEG modules.*

A range of Time Electronics desktop pumps feature a dual output manifold. These are recommended for use with the XTEG pressure measurement module. One output is connected to the XTEG and will provide the master reference reading. The other output can be connected to the UUT.

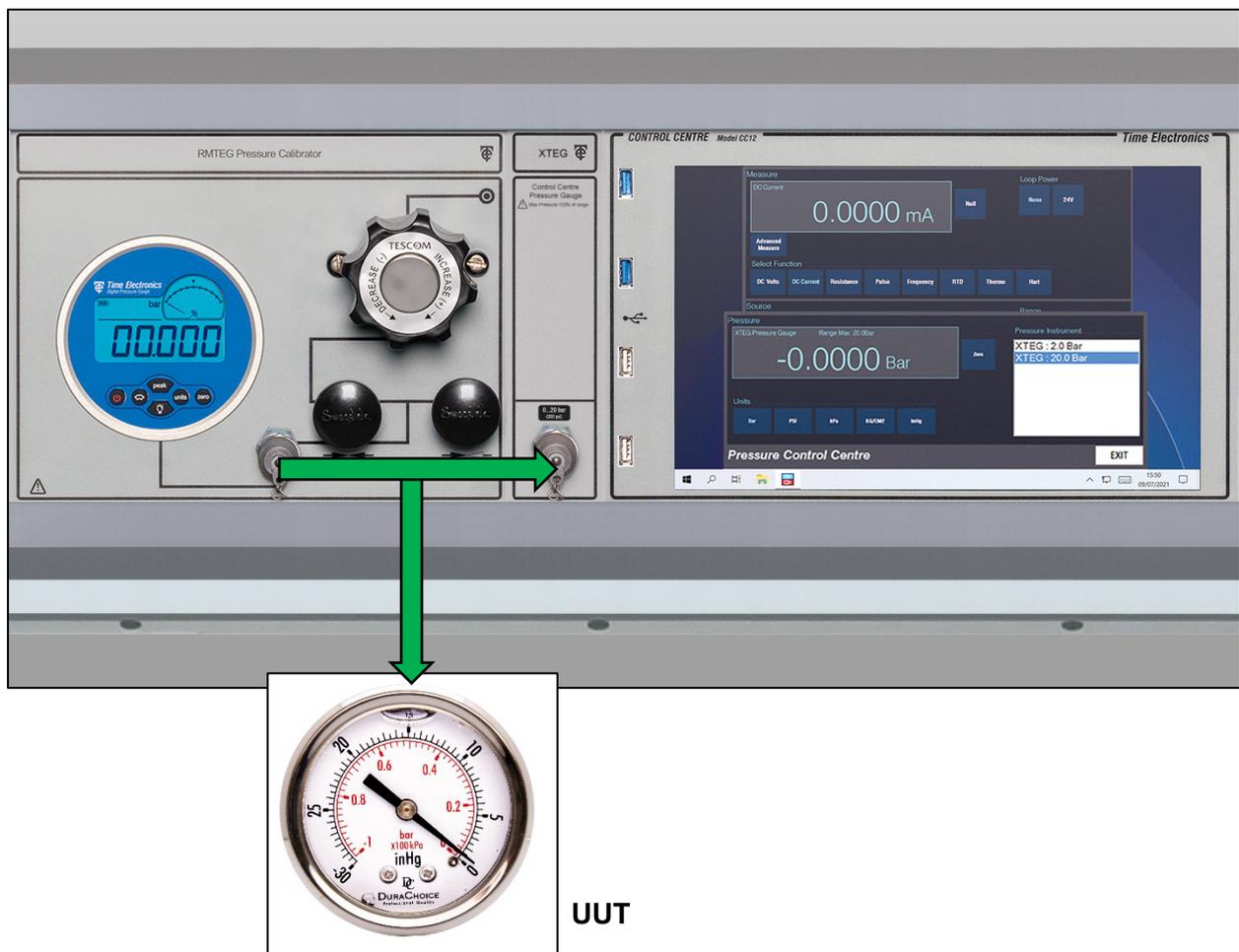
The desktop pumps feature a connection that is made without tools, this allows the UUT connections to be quickly changed for the next instrument that needs calibration.

4.5.2 Using a regulated supply

It is possible to perform calibrations used a compressed air source or compressed gas bottle source, that has been regulated. Often this is available in a CalBench that has been fitted with some regulated modules, such as the RMTEG. If the regulated module already has a pressure indicator fitted, the advantage is being able to use a pressure inidicator with better suited range and therefore higher accuracy.

For example a 200bar regulated module (RMTEG) is supplied by a compressed gas bottled. The 200bar RMTEG has a accuracy of 0.02% FS, equal to ± 0.04 bar. The instrument to calibrate (UUT) has a range of 70bar, and the CalBench has a 100bar XTEG fitted. The XTEG also has an accuracy of 0.02% FS but because of the lower range is equal to ± 0.02 bar. By using the regulated output of the RMTEG to feed the XTEG as a master instrument and the UUT it is possible to improve the test accuracy.

This method of calibration should be used with caution, as to ensure the user does not input too high a pressure into the XTEG sensor.



Connection for using the output of a regulated module to supply test pressure to an XTEG as well as a unit under test (UUT). The same can be performed with the 8030B controller module. Benchtop manifolds can also be used to aid in the set up of this method of reference calibration.

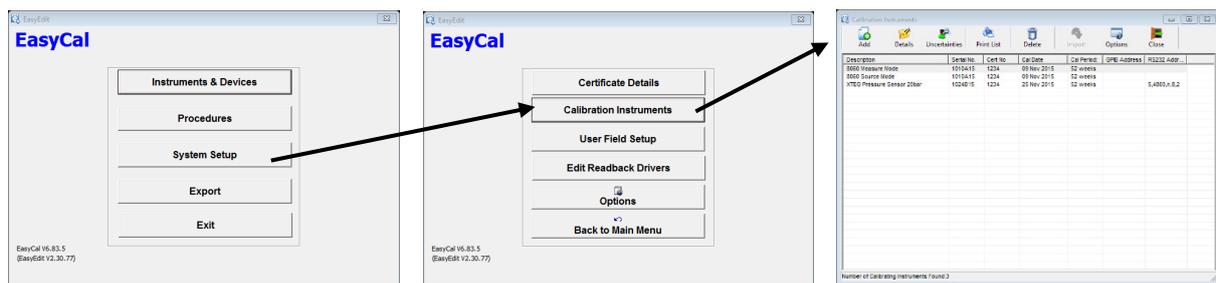
5 Using XTEG with EasyCal

5.1 XTEG EasyCal configuration

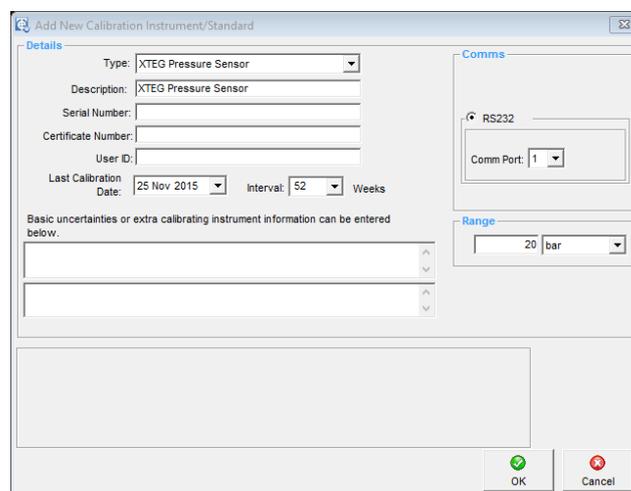
It is possible to automate pressure calibrations with the XTEG by using EasyCal software. The XTEG must be configured in EasyCal as a Calibration Instrument.

Note: On a new CalBench equipped with an XTEG and EasyCal software, this will be done as standard from the factory.

To do this start EasyEdit and select 'System Setup' and then 'Calibration Instruments':



If the XTEG is not already on the list of Calibration Instruments, it will need to be added, so press the 'Add' button:



Type: In the type list, select 'XTEG Pressure Sensor'.

Serial number, certificate number and last calibration date: The serial number, certificate number and last calibration date can be found on the calibration certificate for the module.

Range: The range of the XTEG module can be found on the front panel next to the measurement port.

RS-232: The XTEG is connected to the PC and creates a virtual comm port. The comm port number can be found using Windows device manager.

It is also possible to add uncertainties for the instrument as well as a User ID. Refer to EasyCal manual for further information on these.

5.2 Using the XTEG in EasyCal procedures

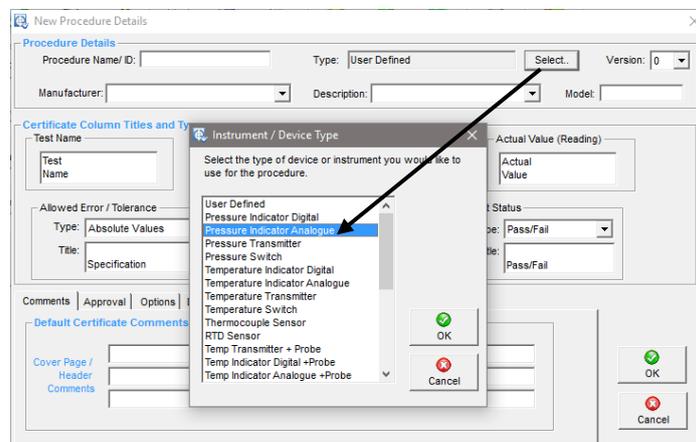
It is possible to use the XTEG in existing procedures or by creating a new procedure using device wizards.

5.2.1 Device Wizard for a pressure gauge calibration

The following is an example of creating a procedure to calibrate a pressure gauge.

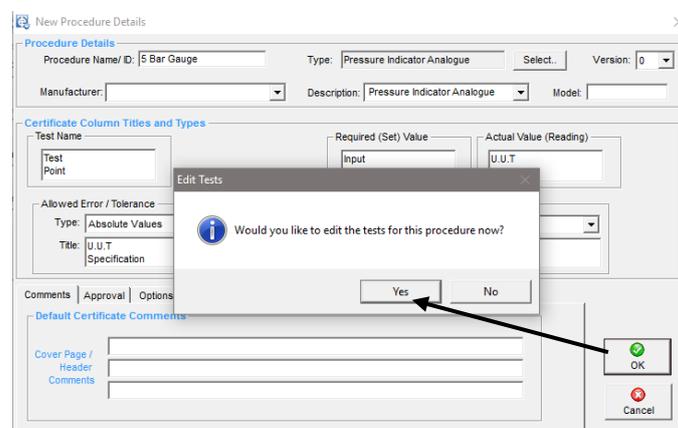
First create a new procedure, by loading EasyEdit, click 'Procedures' and then click 'New'.

EasyCal may show the device type selection automatically, depending on EasyCal options. If the device type selection is not shown, click on the 'select' button to show it:

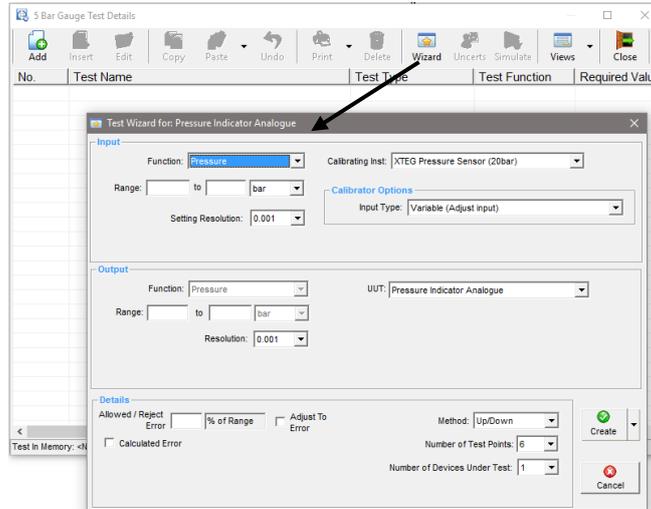


Select 'Pressure indicator analogue', and then click 'OK'.

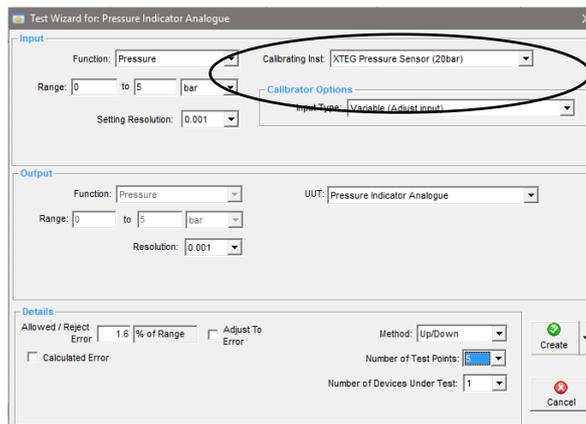
Give the procedure a name in the Procedure Name field, and optionally fill out Manufacturer, Description and model. Click 'OK' and confirm that you want to edit the tests.



The new procedure will open ready for editing, and will be empty without any tests listed, so the wizard is used to automatically create the tests. Click on 'Wizard':



First change the calibrating instrument to the XTEG measurement port to use for the calibration.



Then the wizard is set up for a 5bar gauge, which is calibrated 0 to 5 bar over 5 test points - 0%, 25%, 50%, 75% and 100% of the range. The method is up/down so the tests will step through the test points going up and pressure and then the same test points going down in pressure. The gauge is 1.6% accuracy, so that is used for the allowed / reject error.

Click 'Create' and confirm to clear all tests and create to the procedure:

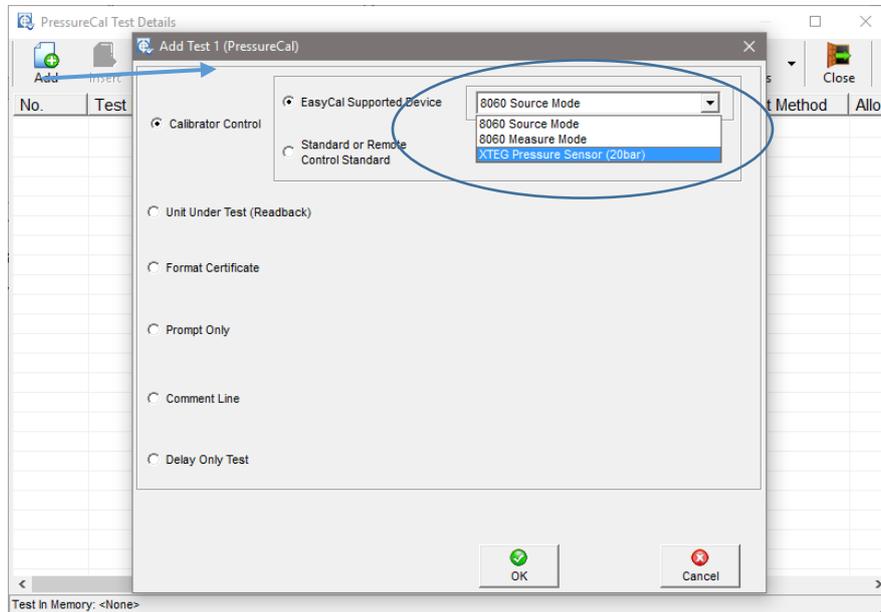
No.	Test Name	Test Type	Test Function	Required Value	Input Method	Allowed Error
1	0%	XTEG Pressure Se...	bar	0.000bar	Readback	0.08bar
2	25%	XTEG Pressure Se...	bar	1.250bar	Readback	0.08bar
3	50%	XTEG Pressure Se...	bar	2.500bar	Readback	0.08bar
4	75%	XTEG Pressure Se...	bar	3.750bar	Readback	0.08bar
5	100%	XTEG Pressure Se...	bar	5.000bar	Readback	0.08bar
6	75%	XTEG Pressure Se...	bar	3.750bar	Readback	0.08bar
7	50%	XTEG Pressure Se...	bar	2.500bar	Readback	0.08bar
8	25%	XTEG Pressure Se...	bar	1.250bar	Readback	0.08bar
9	0%	XTEG Pressure Se...	bar	0.000bar	Readback	0.08bar

This procedure is now ready for use as an automated and guided calibration run. It is possible to use the simulation mode to check the operation of a procedure and make further adjustments. See the EasyCal user manual for detailed reference information.

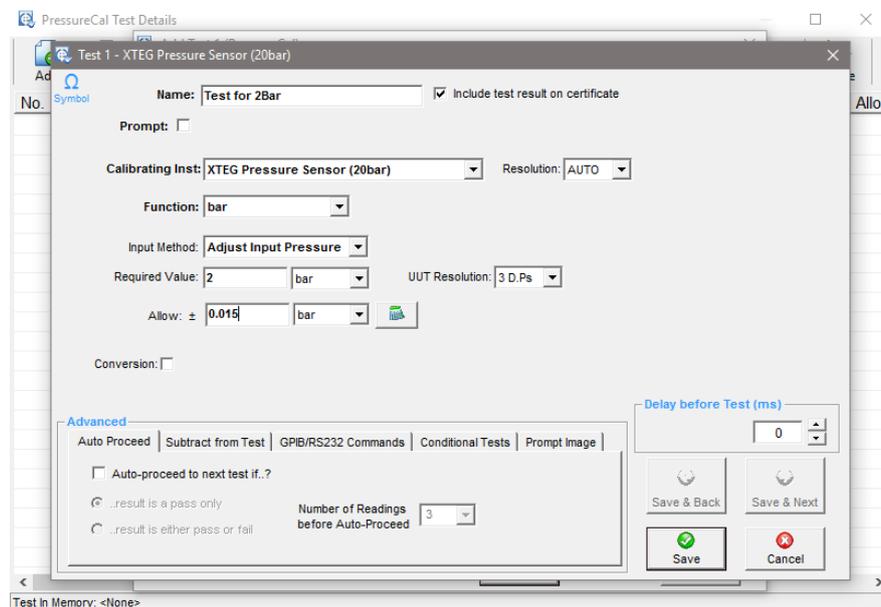
5.2.2 Adding pressure measurement comparisons to existing procedures

It is possible to add XTEG tests to an existing procedure (or a new blank procedure).

Open the procedure and click 'Add to add a test:



Select the XTEG pressure measurement port as an EasyCal supported device, and then 'OK'.



Now fill out the test name, required value and allowed tolerance for the test.

See EasyCal user manual for detailed reference information on the features in the test form.

6 Warranty and Servicing

Warranty

Time Electronics products carry a one-year manufacturer's warranty as standard.

Time Electronics products are designed and manufactured to the highest standards and specifications to assure the quality and performance required by all sectors of industry. Time Electronics products are fully guaranteed against faulty materials and workmanship.

Should this product be found to be defective, please contact us using the below details. Inform us of the product type, serial number, and details of any fault and/or the service required. Please retain the supplier invoice as proof of purchase.

This warranty does not apply to defects resulting from action of the user such as misuse, operation outside of specification, improper maintenance or repair, or unauthorized modification. Time Electronics' total liability is limited to repair or replacement of the product. Note that if Time Electronics determine that the fault on a returned product has been caused by the user, we will contact the customer before proceeding with any repair.

Calibration and Repair Services

Time Electronics offers repair and calibration services for all the products we make and sell. Routine maintenance by the manufacturer ensures optimal performance and condition of the product. Periodic traceable or accredited calibration is available.

Contacting Time Electronics

Online:

Please visit **www.timeelectronics.com** and select Technical Support from the Contact links. From this page you will be able to send information to the Time Electronics service team who will help and support you.

By phone:

+44 (0) 1732 355993

By email:

mail@timeelectronics.co.uk

Returning Instruments

Prior to returning your product please contact Time Electronics. We will issue a return merchandise authorization (RMA) number that is to accompany the goods returning. Further instructions will also be issued prior to shipment. When returning instruments, please ensure that they have been adequately packed, preferably in the original packing supplied. **Time Electronics Ltd will not accept responsibility for units returned damaged.** Please ensure that all units have details of the service required and all relevant paperwork.

Send the instrument, shipping charges paid to:

Time Electronics Ltd

Unit 5, TON Business Park, 2-8 Morley Road,
Tonbridge, Kent, TN9 1RA.
United Kingdom.

Tel: +44(0)1732 355993

Fax: +44(0)1732 350198

Email: mail@timeelectronics.co.uk

Web Site: www.timeelectronics.com

Disposal of your old equipment



1. When this crossed-out wheeled bin symbol is attached to a product it means the product is covered by the European Directive 2002/96/EC.
2. All electrical and electronic products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities.
3. The correct disposal of your old appliance will help prevent potential negative consequences for the environment and human health.
4. For more detailed information about disposal of your old appliance, please contact your city office, waste disposal service or return to Time Electronics.