








Getting Started

Pressure Calibrator

TABLE OF CONTENTS

WARNINGS	2
TFI CONTACT DETAILS	2
INTRODUCTION.....	3
What is the Pressure Calibrator?	3
Package contents	3
System requirements.....	4
GETTING STARTED	5
Software installation	5
Operation.....	6
Pressure Measurement.....	6
Pressure Application	7
Automated Pressure Calibration	7

WARNINGS

-  Avoid dropping the Pressure Calibrator.
-  Avoid under- or over-pressuring the transducer.
-  There are no user serviceable parts in the Pressure Calibrator. Any significant damage will require the Pressure Calibrator to be returned to TFI for maintenance and recalibration.
-  The warranty will be void if a user dismantles the Pressure Calibrator without specific instructions from TFI.
-  Refer to the Pressure Calibrator's specification sheet for further information on its limitations.

TFI CONTACT DETAILS

Turbulent Flow Instrumentation – Victoria, Australia

- Main website: www.turbulentflow.com.au
- Support website: support.turbulentflow.com.au
- Email support: support@turbulentflow.com.au
- Phone support: (61 2) 6020 9250

INTRODUCTION

This document outlines the basic procedure for using the TFI Pressure Calibrator.

What is the Pressure Calibrator?

The Pressure Calibrator is a versatile device for measuring and applying pressures with high precision. The Pressure Calibrator can be used as a reference pressure sensor and for the automated calibration of other pressure sensors. For use as a precision pressure sensor, only a USB connection to a PC is required. For operation as a pressure applicator, an external power supply is required. The Pressure Calibrator is supplied fully calibrated and ready to use, and can operate via its own software or via the *TFI Device Control* software for automated calibrations. Figure 1 shows a diagram of the Pressure Calibrator indicating its main features.

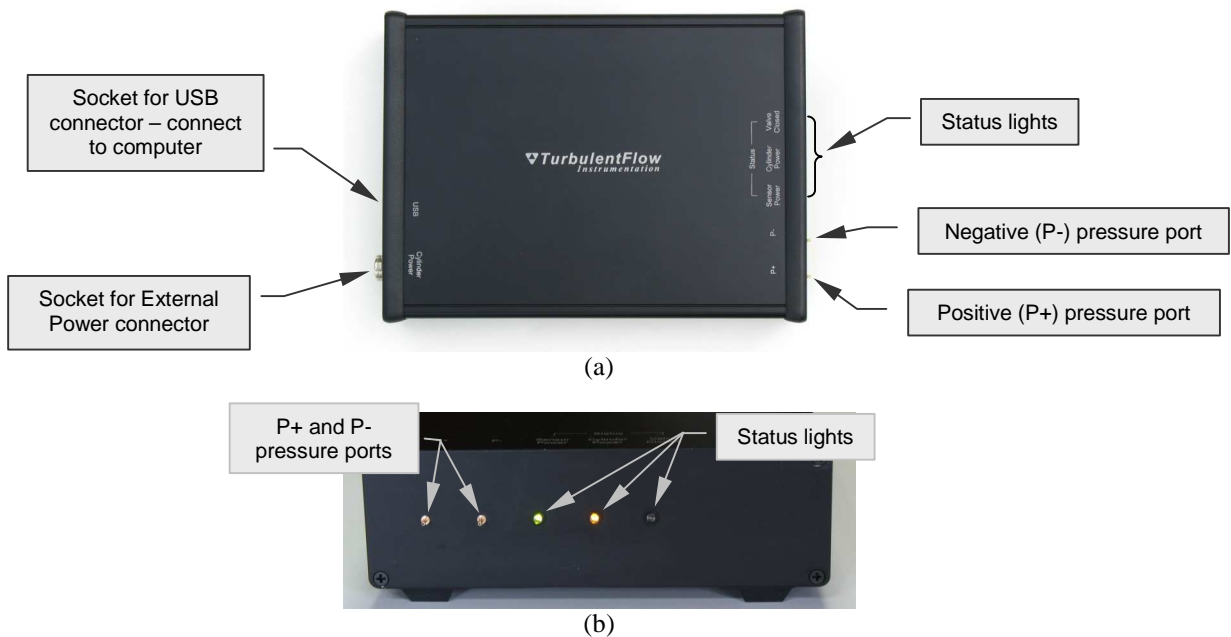


Figure 1: Pressure Calibrator main features: (a) plan view; (b) end view showing the status lights

Package contents

Your Pressure Calibrator should have been supplied with the following items. If any items appear to be missing or damaged, contact TFI as soon as possible.

- Pressure Calibrator main unit
- USB cable
- External power supply
- Software installation CD – *TFI Device Control*
- This guide
- Any additional items that were ordered

System requirements

A connection to a computer is required to use the Pressure Calibrator. The connection is normally made via USB, which provides power to the pressure sensor for measuring pressures and allows transfer of real-time pressure data. If it is required to generate a pressure, an external power supply must be connected to power the integrated pressure cylinder.

There are two methods of operating the Pressure Calibrator software – standalone or via the *Device Control* software. The requirements below will allow full operation of the Pressure Calibrator in either mode of operation.

Table 1: Minimum required computer system for running the *Device Control* software


Operating system	Microsoft® Windows 2000 or XP
Processor	Pentium 500 MHz or equivalent
RAM	128 MB
Display	1024x768, 65536 colours (16-bit)
USB	USB 1.1 or newer
Storage (program)	15 MB

GETTING STARTED

The following pages introduce the Pressure Calibrator set-up and operation.

Software installation

The Pressure Calibrator requires both application software and system drivers to be installed. The application software is installed with the *TFI Device Control* software, which is contained on the supplied CD. The system drivers are also located on the CD, and will be required when the calibrator is first attached to a computer.

 To successfully install the *Device Control* software and system drivers, you will need administrator rights if installing under recent versions of Microsoft® Windows (including Windows 2000 and XP).

To install the *Device Control* software:

- Insert the installation CD (run *Setup.exe* from the CD if installation does not start automatically)
- Follow the on-screen instructions and upon reaching the **Choose Components** screen, refer to Figure 2

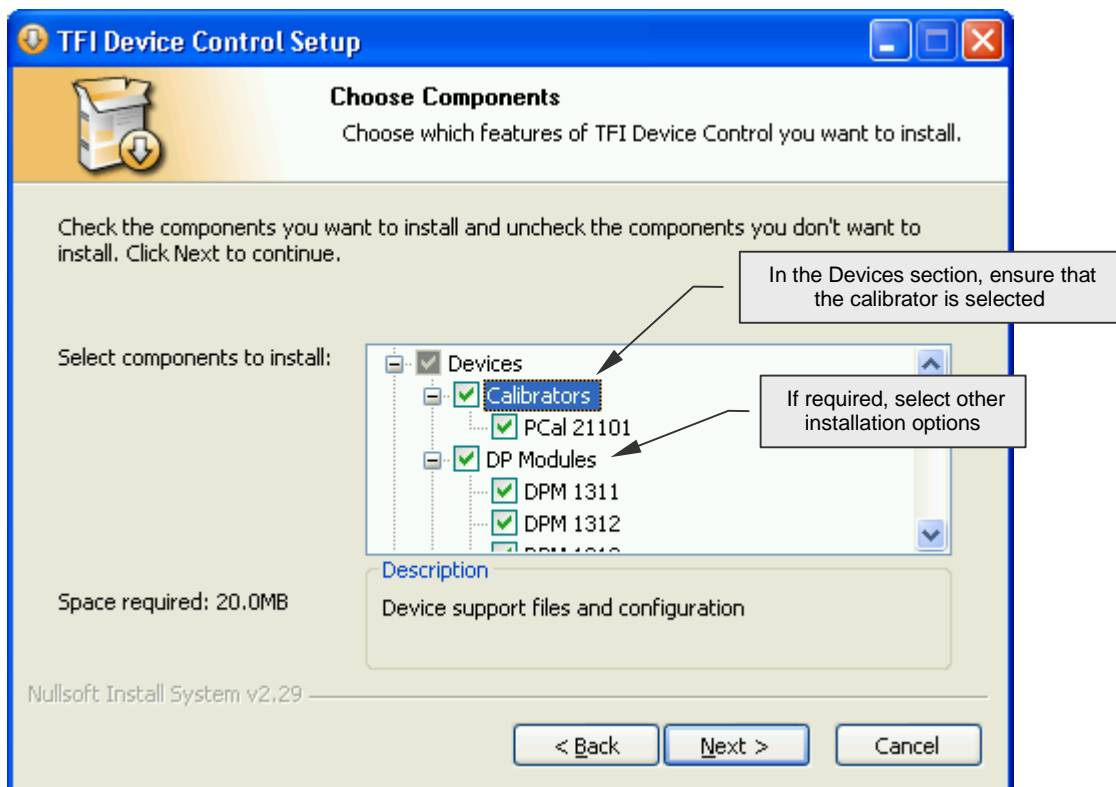


Figure 2: Software installation – Choosing which components are installed

When the Pressure Calibrator is first attached to a computer, you may be prompted to install the required system drivers. These drivers are contained on the supplied software installation CD.

After installation is complete, you can run the software – you should not need to restart your computer.

Operation

There are three modes of operation for the pressure calibrator: pressure measurement; pressure application; and automated pressure calibration. Each mode is discussed below.

i On some models, the negative (**P-**) pressure port is not connected internally, and is thus not used.

Pressure Measurement

For pressure measurement, the Pressure Calibrator must be connected to a PC via a USB cable; USB is used to provide power to the pressure sensor and to transmit pressure data to the PC. When the USB cable is connected to the Calibrator and a PC that is turned on, the **Sensor Power** status light (Figure 1) will be illuminated (green). It is not required to connect the External Power connector, although pressure measurement is still possible when the Pressure Calibrator is connected to external power.

Once the USB cable has been connected to the Pressure Calibrator (Figure 1) and the computer:

1. Open the Pressure Calibrator utility software from the Start menu
2. Apply a pressure to the positive (**P+**) pressure port (see Figure 1) by connecting tubing from the measurement location to the **P+** pressure port
3. The measured pressure will be displayed in the **Current Pressure** box in the Pressure Calibrator window (see Figure 3)

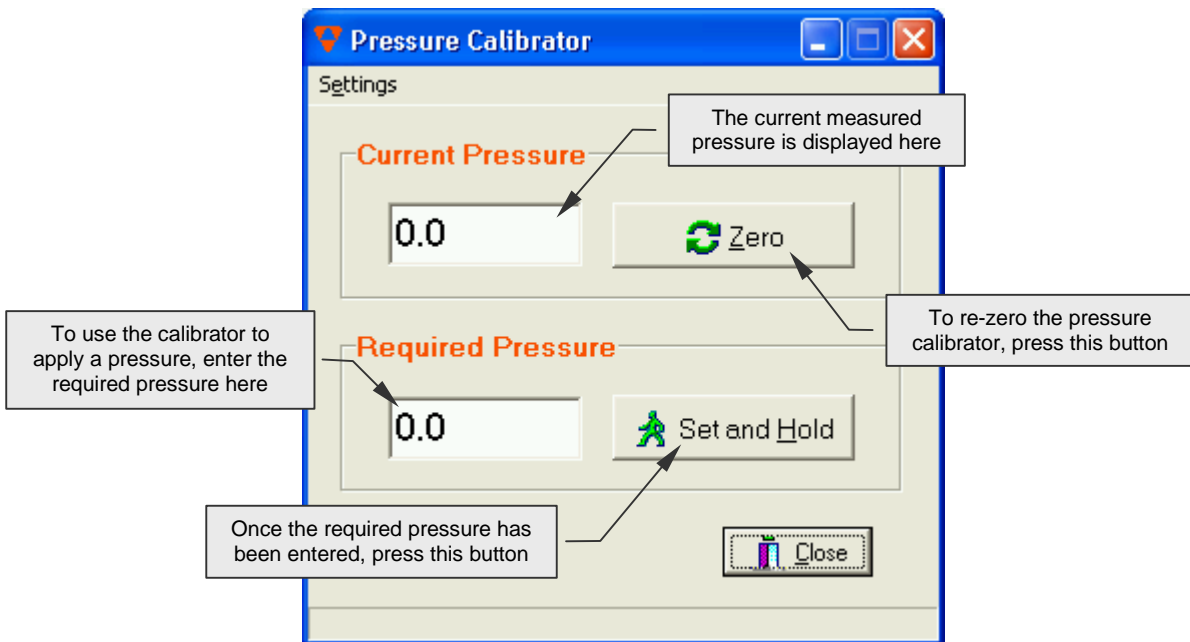


Figure 3: Pressure Calibrator window

i Note that pressures are measured relative to the negative (**P-**) pressure port. The measured pressure is therefore the difference between the pressures at the **P+** and **P-** pressure ports. If the **P-** pressure port is not connected internally, then it will experience the pressure of the location where the pressure calibrator unit is situated, and all measured pressures will be relative to this.


Pressure Application

To apply a pressure to another pressure transducer, two electrical connections are required – the USB cable to a PC (as for **Pressure Measurement**) and the External Power cable. External power is required to operate the internal pressure cylinder that applies pressures. When the External Power cable is connected to the Calibrator, the **Cylinder Power** status light (Figure 1) will be illuminated (orange).

Once the USB cable and External Power cable are connected, a pressure may be applied to another transducer:

1. Open the Pressure Calibrator utility software from the Start menu
2. Using appropriate tubing, connect the transducer that requires the applied pressure to the positive (**P+**) pressure port (see Figure 1)
3. If using the Pressure Calibrator for the first time, go to the **Settings** menu in the top left-hand portion of the window (see Figure 3) and choose **Find Home**. This will reset the pressure cylinder to the centre of its range, thus allowing application of the full range of pressures
4. Enter the pressure to be applied in the **Required Pressure** box of the Pressure Calibrator window (see Figure 3)
5. Click the **Set and Hold** button to apply the pressure (see Figure 3)
6. While the pressure is being applied, the **Set and Hold** button will change to **Stop**. Click **Stop** at any time to remove the applied pressure.

 Note that pressures are applied relative to the negative (**P-**) pressure port.

 When the Calibrator is applying a pressure, the **Valve Closed** status light (Figure 1) will be illuminated (red).

Automated Pressure Calibration

The hardware set up for automated pressure calibration is the same as for pressure application – both USB and External Power connections are required. However, the calibration is performed using the *TFI Device Control* software.

Once the USB cable and External Power cable are connected:

1. Open the Device Control software from the Start menu
2. Select **Devices** from the **Settings** menu and click on the pressure-based device in the **Active Devices** or **Installed Devices** list that is to be calibrated. In the **Settings** box on the right-hand side of the window, click on **Calibration**. In the **Voltage Scaling** tab, click on **Calibrate**. The window should now look similar to Figure 4.
3. Select your Pressure Calibrator in the drop-down list (see Figure 4) to set it as the active Calibration Device.
4. Click **Zero** to remove voltage offsets from the Pressure Calibrator before commencing the calibration (see Figure 4).
5. Click on the **Auto Calibration** button. The Configuration window will appear (see Figure 5).
6. Enter the **Maximum Pressure**, **Minimum Pressure**, and either the **Pressure Increment** or the **Number of Points** that is required for the calibration. The remaining parameter will be automatically calculated from the first three.
7. Click **OK** to start the calibration.
8. When the calibration is complete, click **Apply Calibration** (see Figure 4) to accept and apply the calibration to the device.

- ❏ Note that pressures are applied relative to the negative (**P-**) pressure port. Therefore the **P-** port of the Pressure Calibrator and the negative side of the transducer being calibrated should be at the same pressure.
- ❏ In order to improve accuracy, it is necessary to zero the Pressure Calibrator before commencing a calibration. Zeroing removes the voltage offset from the transducer within the Calibrator. The voltage offset will change depending on ambient temperature and the length of time that the instrumentation has been turned on.
- ❏ For configuring the calibration (step 6 & Figure 5), the **Maximum** and **Minimum Pressures** should be the pressure range of the device being calibrated. Generally 5-7 points is enough to provide a good Volts-to-Pressure ratio when calibrating a transducer. However, if linearity and hysteresis must be fully accounted for by the calibration, 15 points or more should be used.
- ❏ Each time the Calibrator applies a pressure, the Valve Closed status light (Figure 1) will be illuminated (red).

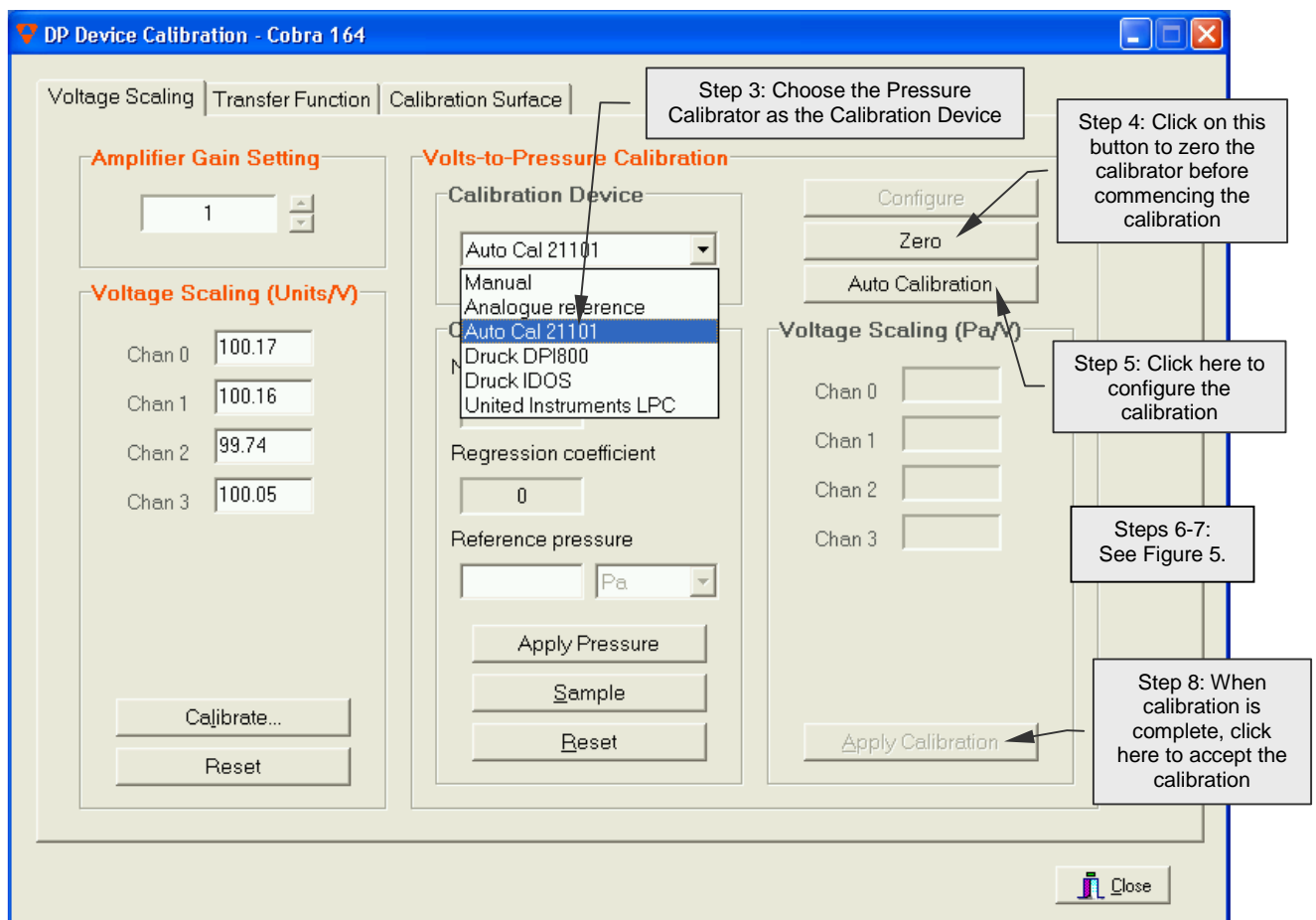


Figure 4: Automated Pressure Calibration

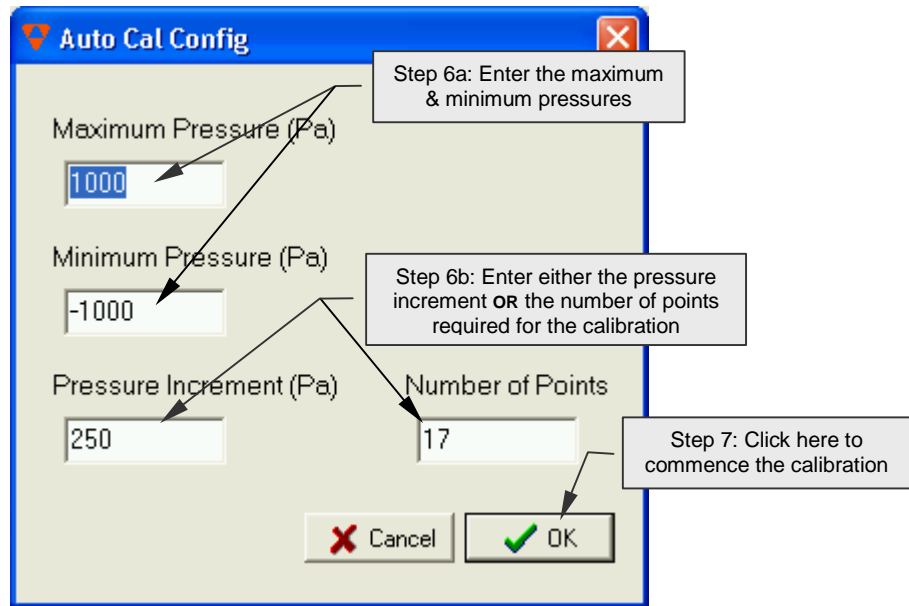


Figure 5: Automated Pressure Calibration: Configuring the calibration