



Time Electronics
Calibration, Test and Measurement

User Manual

7165 High Pressure Compressor

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Nothing from this manual may be multiplied, or made public in any form or manner, either electronically or hard copy, without prior written consent from Time Electronics Ltd.

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

A range of compact pressure compressor pumps for supplementing calibration benches and pressure instruments. Primarily designed for use with the 8030 pressure controller, 7165 models can be used to create a fully automated pressure calibration system. This removes the requirement for nitrogen cylinders or bulky high pressure compressors.

Four versions are available with pressure generation up to 70 bar. Each unit is supplied pre-configured to the controller or calibrator they are supplementing, enabling quick and easy set up by the end user. This works by pre-setting the 7165 pressure to approximately 110 % above the controller line pressure requirement. Once connected, the pump can be started in two button presses to reach the pressure set point.

In addition to the standard transportable 7165 models, a CalBench integrated version is available. This solution situates the pump inside the CalBench console to create a self-sufficient pressure system. It is ideal for CalBenches used in small workshops or containers. CalBench integrated versions do not feature a panel display, but are operated via a virtual control software application on the control centre module.

1.2 Features

- Compact electric pressure pump
- Suitable for use with pressure controllers
- Models for 17, 35, 50 or 70 bar
- Oil free system, provides clean dry air
- Front panel controls and display
- Accuracy 1 % FS
- RS-232 interface for remote control
- Minimes fitting on output, hose supplied
- Virtual control software

1.3 Models

7165/G17b.....Pressure Compressor/Pump (0 to 17 bar)

7165/CV17b..... Pressure Compressor/Pump (-0.8 to 17 bar)

7165/G35b.....Pressure Compressor/Pump (0 to 35 bar)

7165/CV35b..... Pressure Compressor/Pump (-0.8 to 35 bar)

7165/G50b.....Pressure Compressor/Pump (0 to 50 bar)

7165/CV50b..... Pressure Compressor/Pump (-0.8 to 50 bar)

7165/G70b.....Pressure Compressor/Pump (0 to 70 bar)

7165/CV70b..... Pressure Compressor/Pump (-0.8 to 70 bar)

2 Specifications

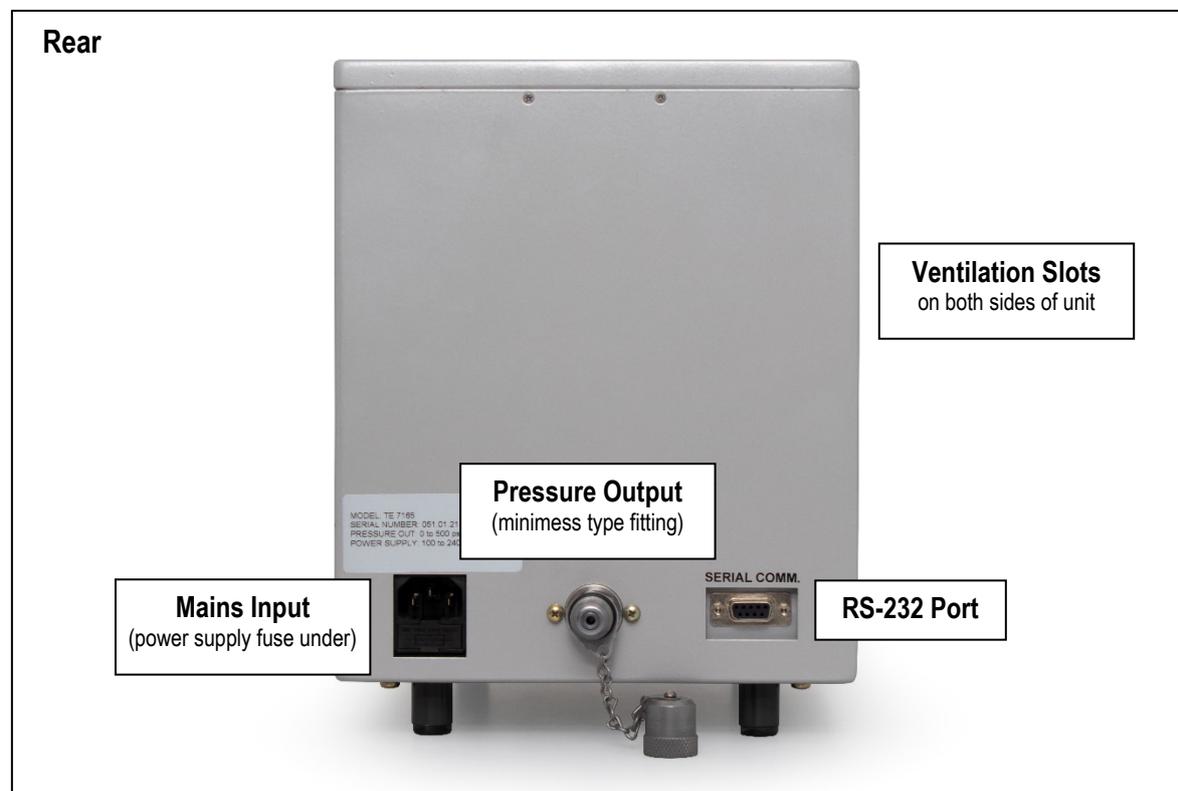
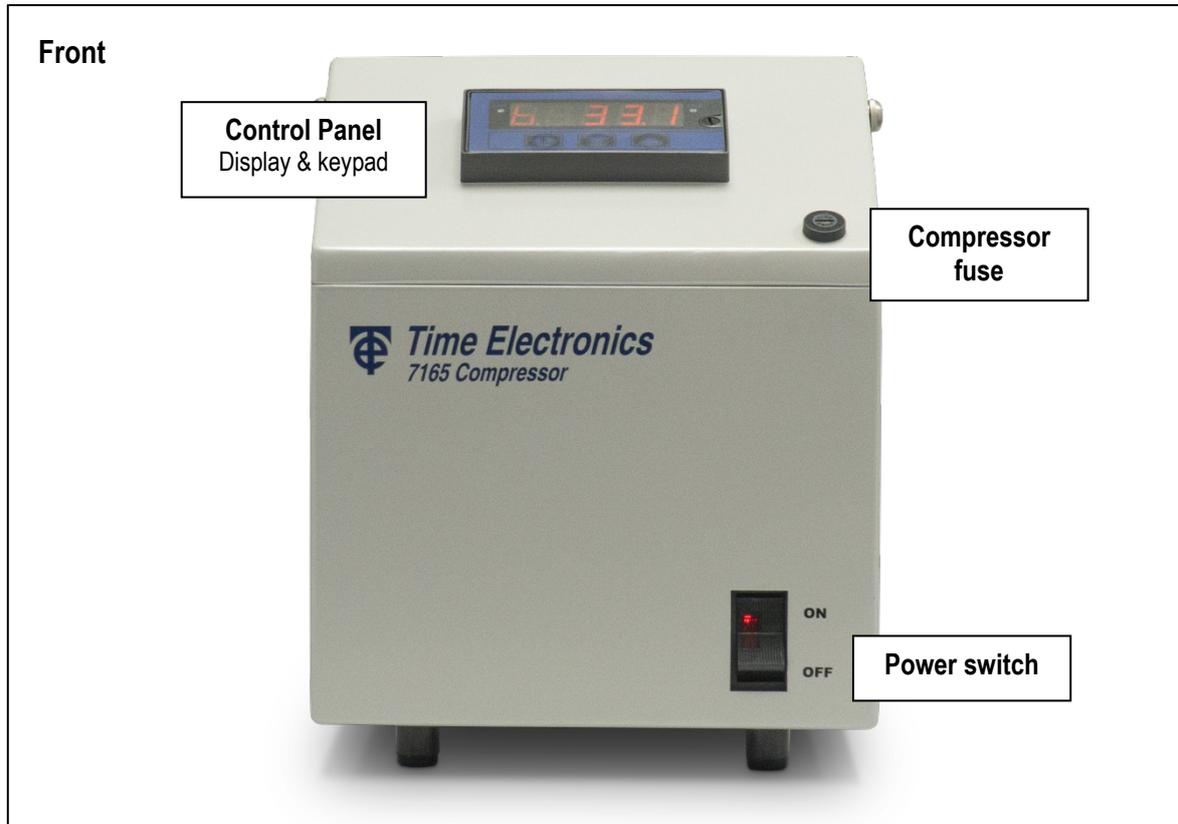
Pressure Ranges/Models	7165/G17b: 0 to 17 bar 7165/CV17b: -0.8 to 17 bar 7165/G35b: 0 to 35 bar 7165/CV35b: -0.8 to 35 bar 7165/G50b: 0 to 50 bar 7165/CV50b: -0.8 to 50 bar 7165/G70b: 0 to 70 bar 7165/CV70b: -0.8 to 70 bar
Compressor Type	Oil free system, provides clean air with no need for external filters
Accuracy	1 % FS
Pressure Units	psi, bar, kgf/cm ²
Resolution	1 psi, 0.1 bar, 0.1 kgf/cm ²
Front Panel	Front panel 4.5 digit high visibility display with push buttons for modifying pressure output and maintenance
Interfaces	RS-232 communication with virtual control application included for PC or laptop control
Output connection	1/8 " Female BSP with minimess type fitting. Hose supplied with specified output fitting thread.
Power supply	100 to 240 V AC 50/60 Hz
Operating temperature	10 to 50 °C
Operating humidity	0 to 90 % RH
Dimensions	L 280 x H 330 x W 210 mm
Weight	7165 - 17b & 35b: 8 kg 7165 - 50b & 70b: 12 kg

3 Warnings

The 7165 pump is designed for use with pressure controllers. These systems control a supplied pressure source and output them to a unit under test. The 7165 is connected to the line input of the controller. Please observe all warnings and safety instructions when dealing with high pressure supplies and outputs. Please ensure that all users of the instrumentation have fully read and understood operating instructions and safety procedures for handling high pressure systems. Observe all warnings before operating pressure calibration systems.

	<p>Avoid electric shock risk when touching the equipment: Use only suitable power cable with earth connection. Never power the equipment to the mains socket with no earth connection.</p>
	<p>Before working on or removing the pressure connections, perform a vent operation on the 7165. With this operation, the 7165 discharges the pressure of the system internally, making safe the pressure connections and hoses.</p>
	<p>Be careful when supplying pressure to a controller, calibrator or UUT of a set range. The 7165 could over-pressure a sensor or device if set above the allowed pressure. Time Electronics is not responsible for damage to instruments/devices over-pressurized by the compressor.</p>
	<p>Other pressure equipment and accessories (ie hose, reservoirs, protection devices) connected to the compressor must be appropriate to the working pressure range.</p>
	<p>The 7165 should be operated by authorized persons qualified to work on pneumatic high pressure systems. The user is responsible for the configuration and selection of suitable parameters for the 7165 and related instruments. There is a potential risk of personal injury and property damage resulting from incorrect usage. Use the 7165 according to this user manual, any operation not described here is not allowed.</p>
	<p>High voltage is present inside the unit. It can cause damage and injury. Do not make any repair or service inside the equipment without removing the power supply plug from the mains.</p>
	<p>Do not place materials under the pump or around the unit. It requires adequate ventilation.</p>
	<p>Do not over-tighten the input or output connectors as this can damage the threads.</p>
	<p>The fan outlet has a filter that can accumulate dust. It is recommended to clean this filter whenever necessary to avoid overheating the compressor.</p>
	<p>THERMAL CUT-OUT SAFETY FEATURE The 7165 is a compressor for use in sealed systems. In cases of the extended periods of use with high air flow and depending on the ambient thermal condition, the compressor can interrupt its operation due to a rise of temperature detected by the safety device. As soon as the ventilation system brings the compressor temperature back to appropriate levels, which may take a few minutes, the instrument will return to its normal operational status.</p>

4 Controls and Connections



5 Operation

5.1 Operating Precautions

The 7165 is a compressor designed for use with pressure controllers, calibrators and test systems that require a stable pneumatic line pressure. A key benefit of the 7165 is that it removes the requirement for high pressure air and nitrogen cylinders in the lab or workshop.

The unit features an internal low volume pneumatic pump, meaning a relatively low stored energy versus compressed gas systems or cylinders. This is a benefit to site safety and protection in the working environment. However, it should still be noted that the unit can generate high pressure that can be hazardous, so necessary safety precautions must be followed and warnings (section 3) must be adhered to.

Before using the 7165 you should ensure all connections, fittings and hoses are suitably rated for the required operational pressures. You should also ensure that these are in good condition for their dedicated use.

5.2 Working with Controllers and Calibrators

Before operating the 7165 you should know or clearly define the output pressure that you intend to use the unit to supply. Because the 7165 is a low volume system, it is not ideally suited for use with regulators that self-relieve and vent constantly. With such systems the compressor setpoint will not stabilise and there will be a constant requirement for the pump to pressurise against the repeated pressure release of the regulator.

The 7165 is most suitable for use with pneumatic pressure controllers such as the Time Electronics model 8030 (8030B CalBench module). Controllers have a specific pressure range and typically the input requirement is 110% to 120% above this range.

If using the 7165 with an 8030, here are some example settings to use based on the range of the controller:

8030 range (highest sensor)	7165 Set Pressure	7165 Hysteresis Setting
10 bar	13 bar	2.5 bar
20 bar	24 bar	3.5 bar
30 bar	35 bar	4.5 bar
40 bar	45 bar	4.5 bar
50 bar	56 bar	5 bar
60 bar	67 bar	6 bar

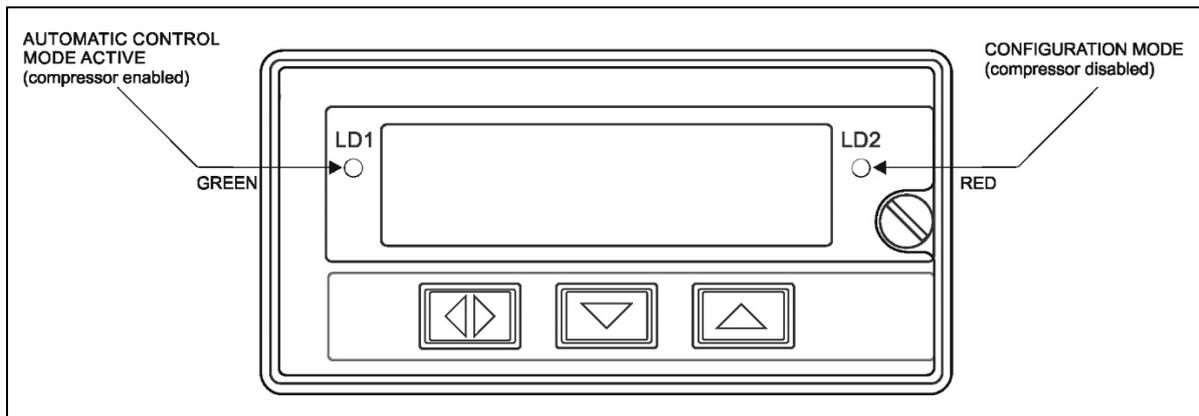
5.3 Operating Modes

The 7165 air compressor has two modes of operation:

- Configuration mode
- Automatic control mode

In the configuration mode parameters are selected and are assigned values to them. This mode is indicated by the led LD2 (red) on. In this mode the compressor is disabled.

In the automatic control mode, the compressor is enabled, and the output pressure is controlled according to the setpoint set. This mode is indicated by the led LD1 (green) on.



5.4 Start-up Procedure

Warning: The 7165 should be connected to the pressure controller or device it will supply pressure to, with all fittings and hoses securely tightened and checked.

To turn on the instrument, connect the power cord of the 7165 to the mains, and set the front panel switch to the ON position.

At start-up, the 7165 defaults to configuration mode, with the compressor disabled.

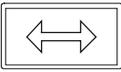
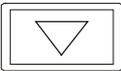
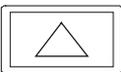
A VENT (pressure relief) operation is started automatically.

The display shows the word VENT and the current system pressure. This operation discharges the system pressure internally until the pressure reading is zero.

After the VENT operation is completed, the display shows the pressure unit. Units are represented by the first character: "p" for psi, "b" for bar, and "k" for kgf/cm² and then the setpoint value.

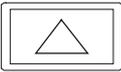
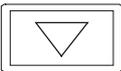
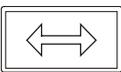


At this stage, the keys have the following functions:

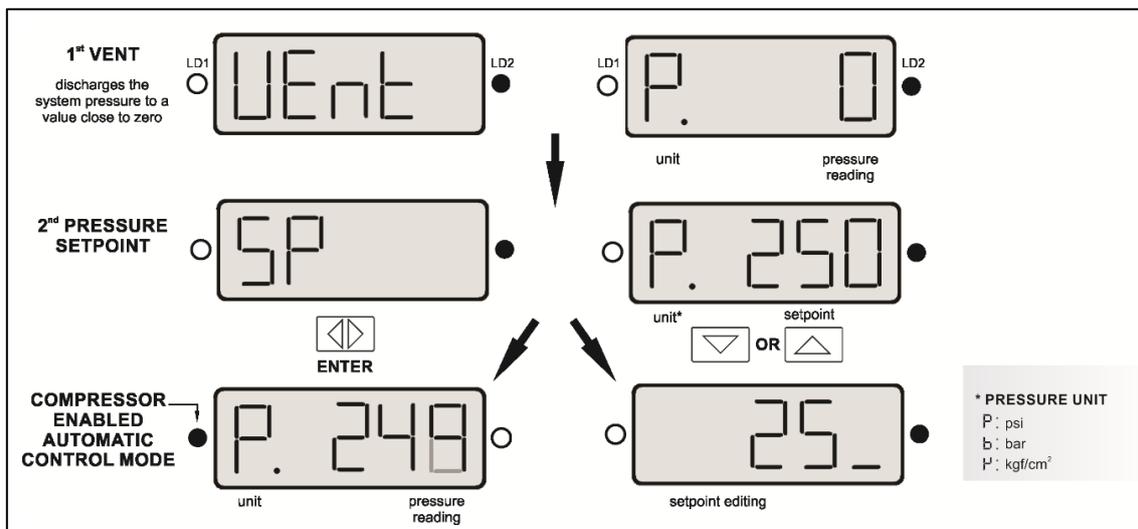
Key		Function
ENTER		Starts automatic control mode
DOWN		Starts editing the setpoint
UP		Starts editing the setpoint

If the setpoint shown is the desired value, simply press the ENTER key to start the automatic control mode (LD1 green on, compressor enabled).

If you want to change the setpoint value, simply press the UP or DOWN key. At the edit level, the keys have the following functions.

Key		Function
UP		Increases the digit
DOWN		Decreases the value
ENTER		Switches to the left digit

Start-up Display and Setpoint Input Steps

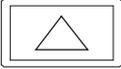
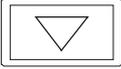
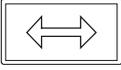


NOTE: All configuration parameters are kept in non-volatile memory and determine the normal operation of the instrument. Through these parameters the user can adapt the instrument according to the needs of the process, in case it is necessary to change the factory configuration.

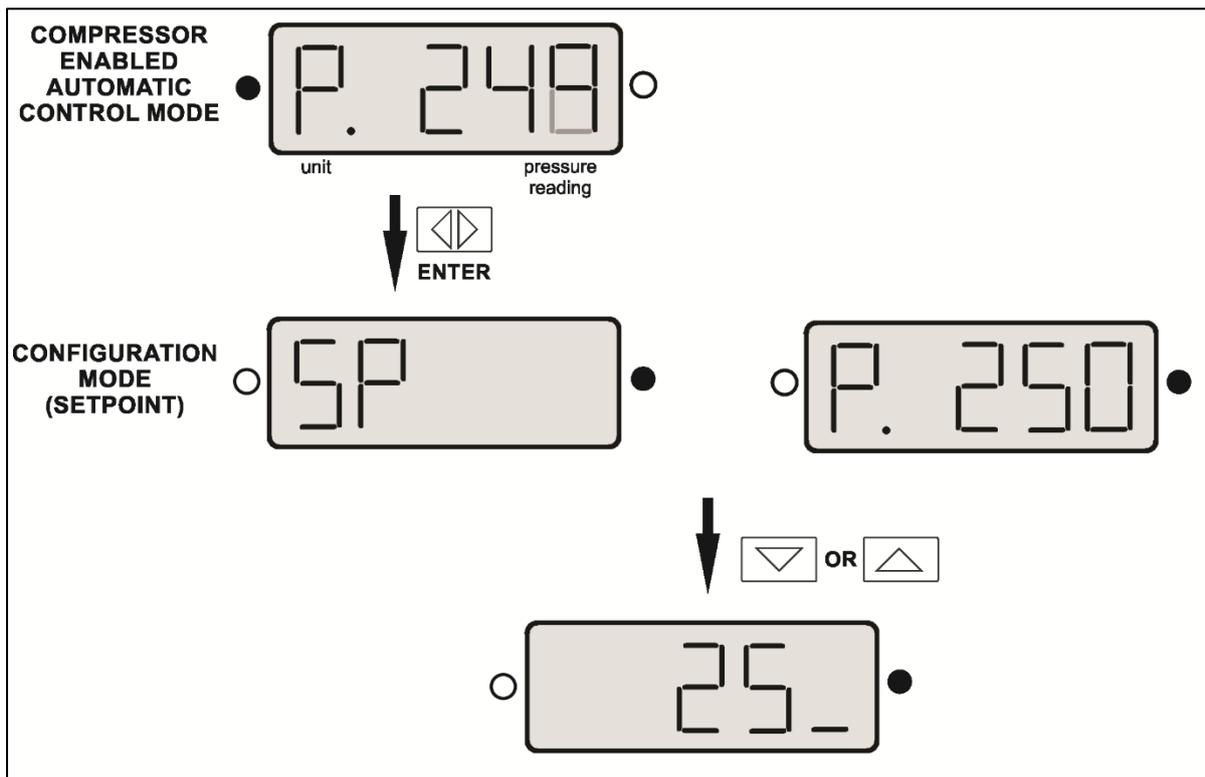
5.5 Pressure Setpoint Editing

When in automatic control mode, to enter configuration mode simply press the ENTER key. Pressing the ENTER key, the SP (setpoint) is displayed.

To edit it, press the UP or DOWN key. At the edit level, the keys have the following functions:

Key		Function
UP		Increases the digit
DOWN		Decreases the value
ENTER		Switches to the left digit

Setpoint Editing Steps



5.6 Configuration Menu

The 7165 has a configuration menu where you can edit the hysteresis parameter, select the pressure unit, and perform the VENT (pressure relief) function.

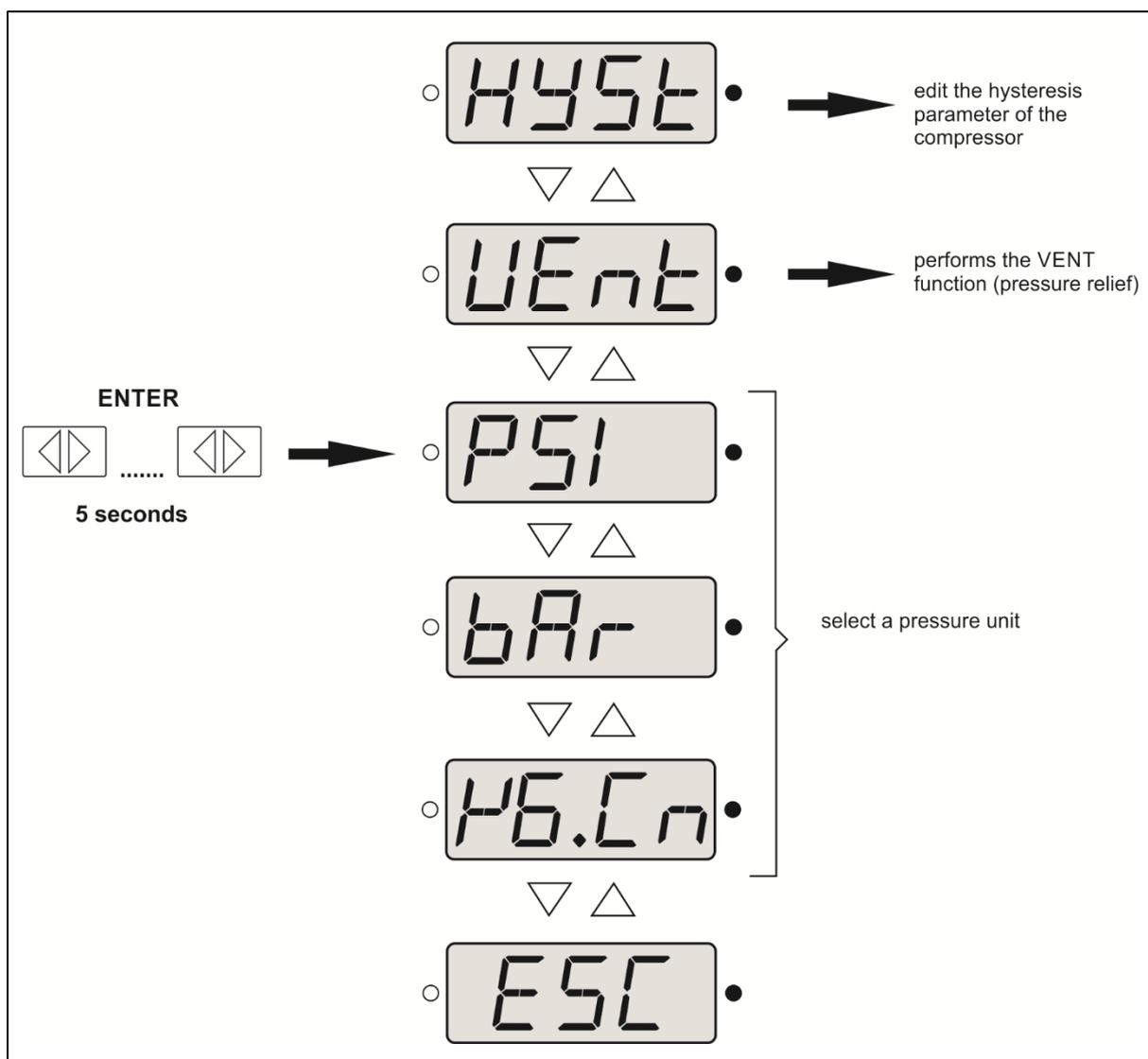
To access this menu, press the ENTER key for more than 5 seconds.

The first option shown in the menu is "psi".

To navigate the menu use the UP or DOWN keys.

Choose the desired option and press the ENTER key. If you want to leave the menu, select the "ESC" option.

Configuration Mode

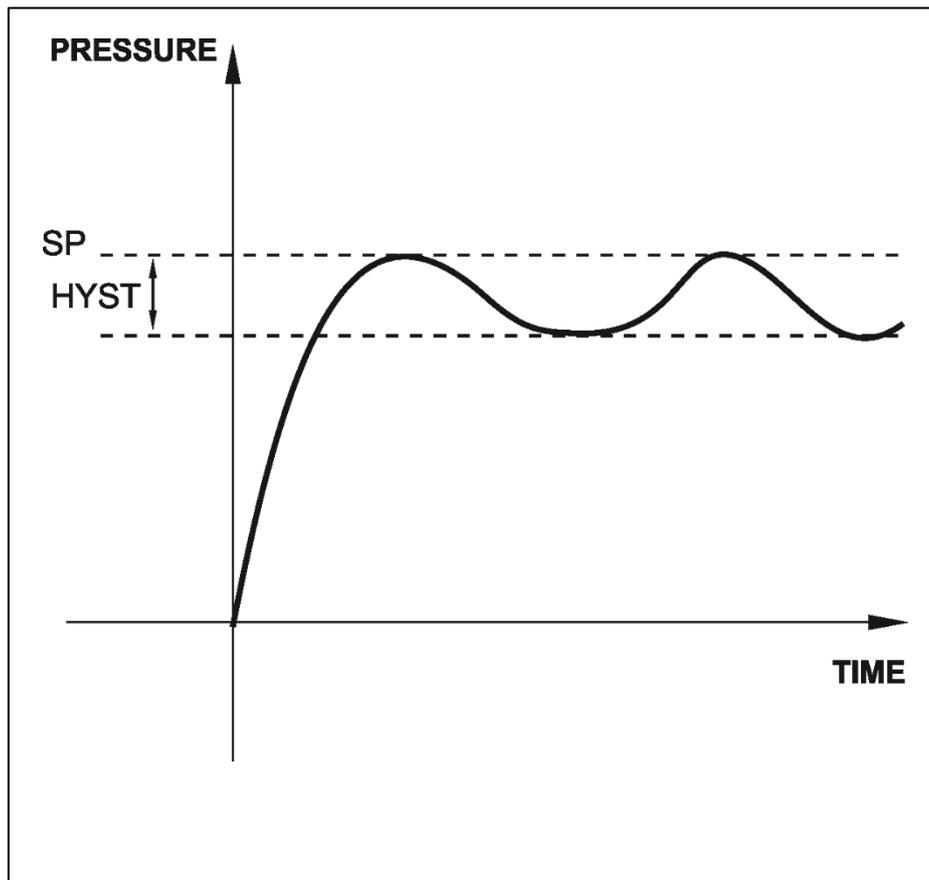


5.6.1 Hysteresis

In automatic control mode, the 7165 keeps the compressor on until the pressure setpoint (SP) is reached. As soon as this value is reached, the compressor is turned off.

The hysteresis pressure setting is the amount of pressure you let the 7165 drop by before the pump re-starts to pressurize to the setpoint.

It is user-configurable and can be set as required for specific applications, or kept as a standard value for a permanent setup with a controller of a certain pressure range.



To edit it, enter the 7165 setup menu by pressing the ENTER key for more than 5 seconds, select the "HYST" option, press the ENTER key and edit the desired value.

Because the 7165 is a low volume compressor, the hysteresis value is useful to set at a value that the controller being supplied pressure is still above it's required input.

Example:

Pressure controller range = 30 bar

Pressure controller allowed pneumatic input = ~35 bar

7165 pressure setpoint = Set to 35 bar

7165 hysteresis value = Set to 4 bar

Outcome: The 7165 will start to pump when the pressure drops to 31 bar, ensuring pressure remains above the input requirement the controller needs to operate effectively.

5.6.2 Venting

The VENT operation (pressure relief) must be performed before removing or making pressure connections. With this operation, the 7165 discharges the pressure of the system, making safe the withdrawal and realization of the pressure connections.

To perform the VENT function, access the 7165 setup menu by pressing the ENTER key for more than 5 seconds, select the "VENT" option and press the ENTER key. The system pressure will be discharged through the VENT port to a safe level.

You can also vent the unit by turning the power switch on and off quickly.

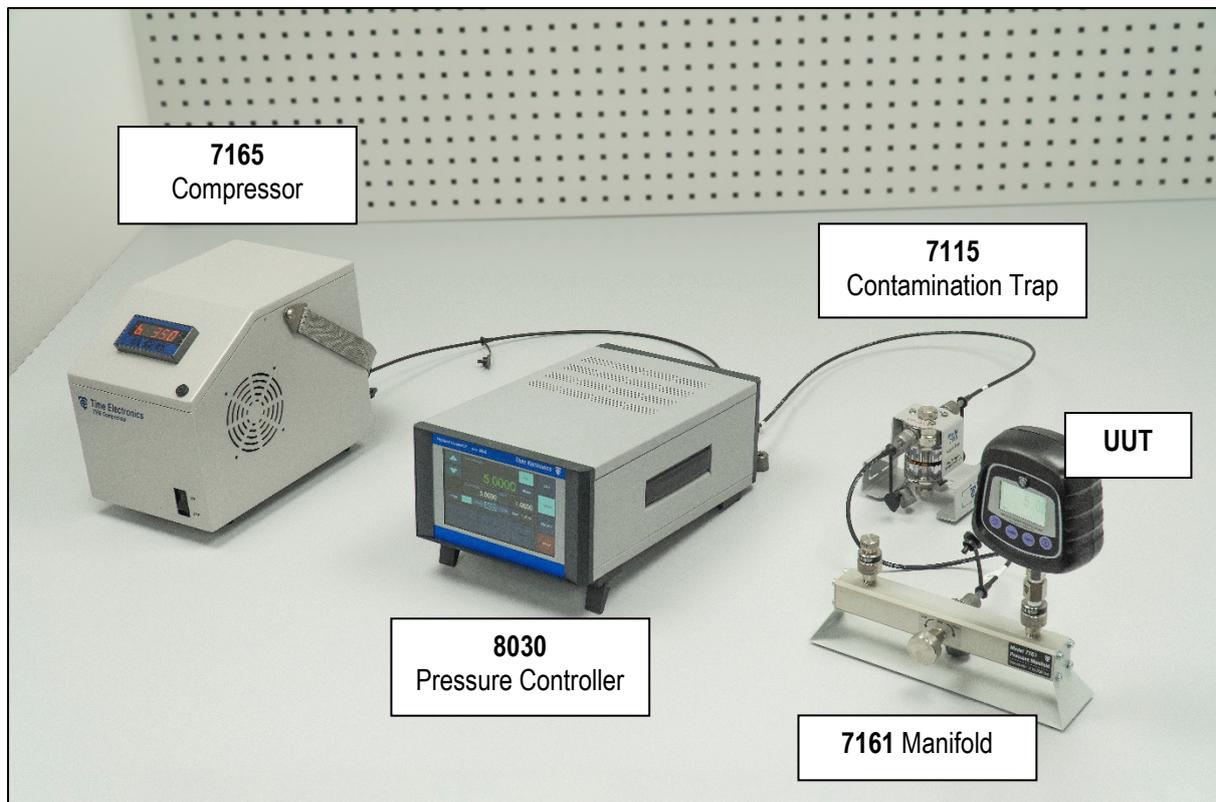
The 7165 vents internal to the case so no pressure is exhausted externally.

5.6.3 Pressure Units

The 7165 is set at the factory with the pressure unit "bar". However, the pressure unit can be changed.

To select the pressure unit, access the 7165 setup menu by pressing the ENTER key for more than 5 seconds, select the desired unit (psi, bar, or kgf/cm²), and press ENTER.

5.6.4 Example Test Setup

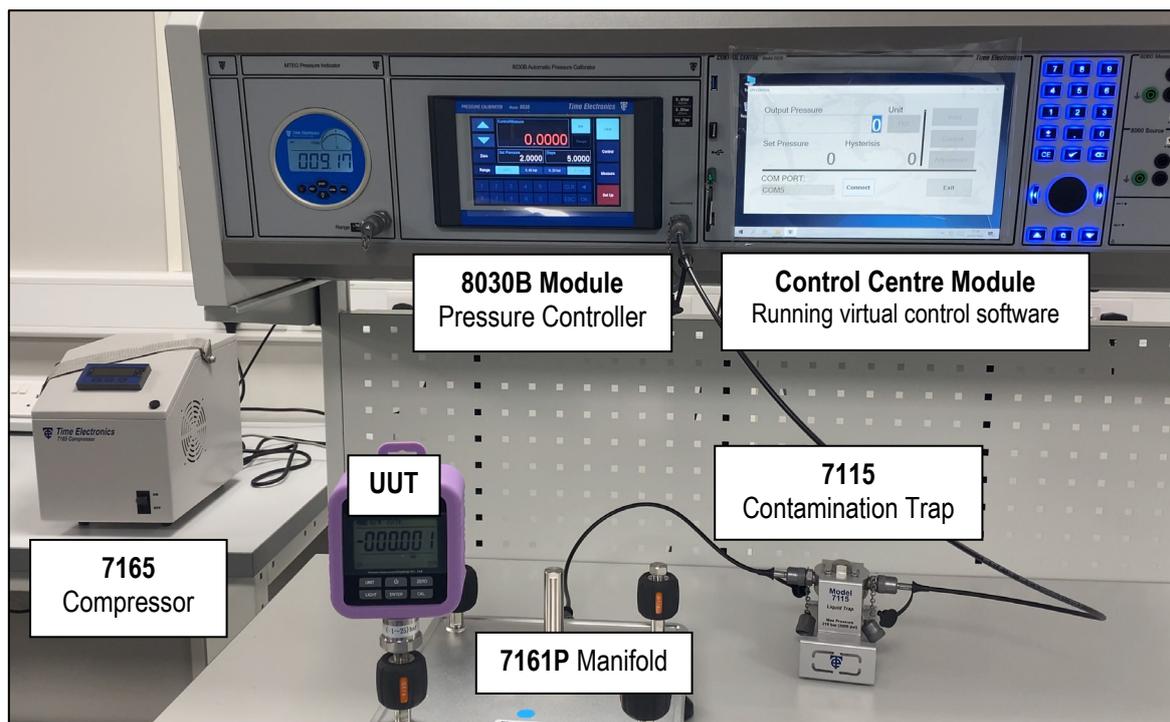


6 CalBench Installations

For customers who have purchased the 7165 with a Time Electronics CalBench system, the unit will be supplied with all the necessary hoses and fittings for usage.

The 7165 can be situated near or far from the bench with the length of hose and RS-232 cable supplied to meet this requirement.

The 7165 can be powered on and the unit can be operated via the virtual control application on the CalBench control centre module.



The pressure hose connects from the rear of the pump to the rear of the console, typically to the 8030B module input. RS-232 from pump to the rear RS-232 port.



7 Virtual Control Software

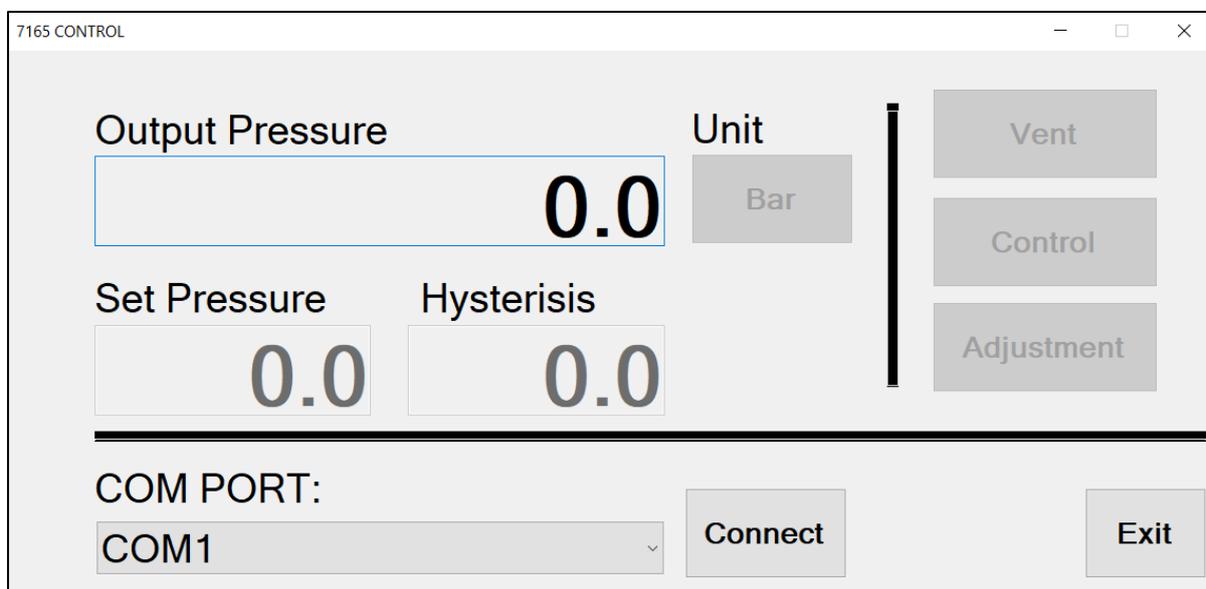
7.1 RS-232 Connection

The 7165 is fitted with an RS-232 port on the rear of the unit. This can be connected to a PC or laptop to run the virtual control software application.

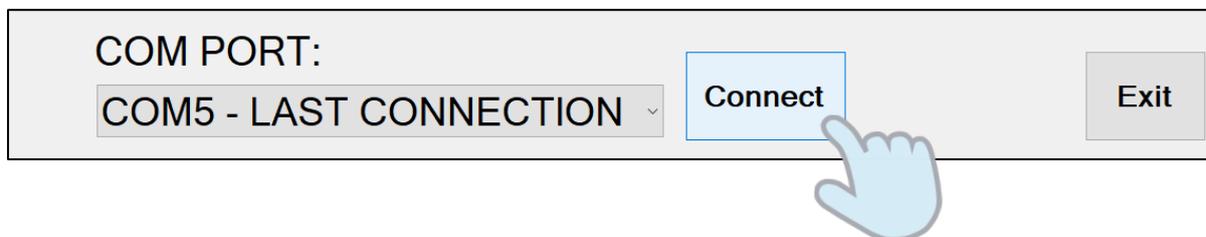
Note: For customers who have ordered the 7165 with a CalBench system featuring a control centre PC module, the software will be pre-loaded and configured for use. The only requirement is to connect the 7165 to the rear RS-232 port and the pressure to the input of the module as shown in section 6.

Once installed you can open the application and the virtual control screen will display.

To connect to the 7165, select the RS-232 comm port you are using from the drop-down menu and press the “Connect” button.

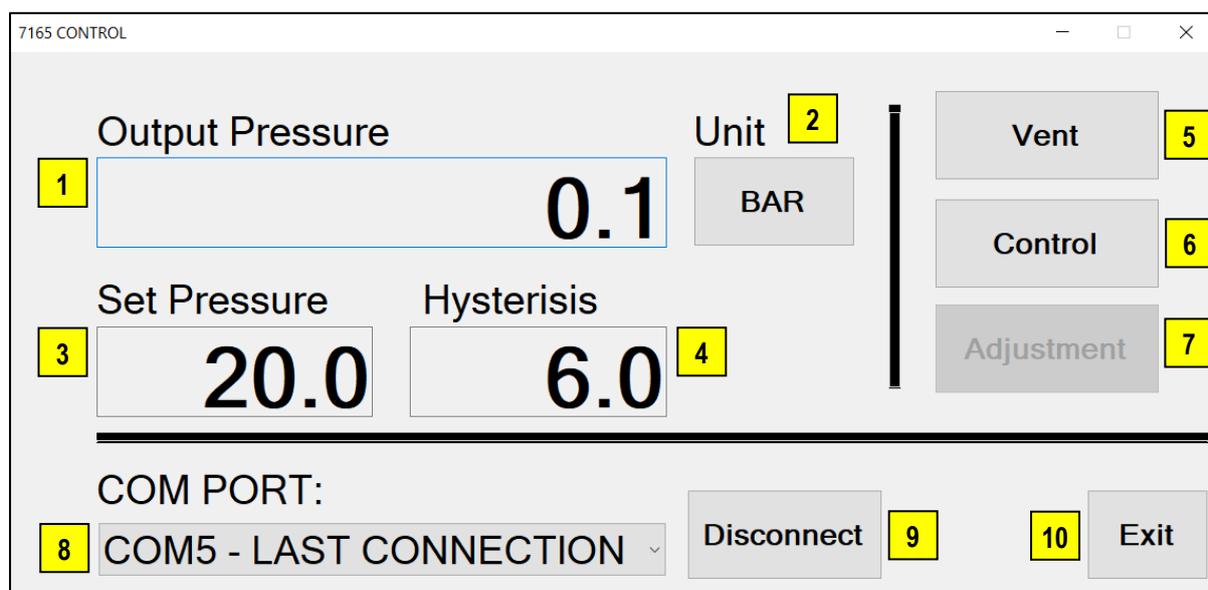


If a previous connection has been made, the unit will default to this COM port so only need to press the “Connect” button once the application opens.



Once connected the buttons will become active and the current settings from the compressor will be displayed. The settings that show will be “Unit”, “Set Pressure” and “Hysterisis”. These settings are commonly preset in the factory before shipment.

7.2 Control Panel

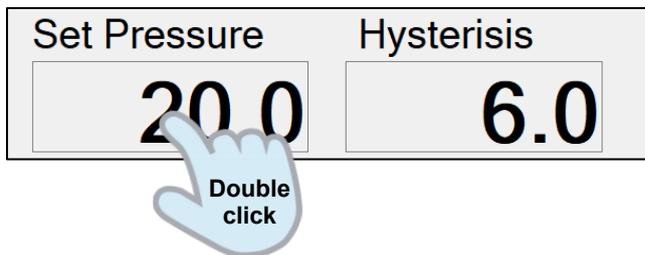


Controls

- 1. Output Pressure**
Displays the pressure being generated by the compressor.
- 2. Unit Button**
A selectable drop-down menu button. It displays the selected pressure unit.
- 3. Set Pressure Box**
An input box that is selectable by double-click to enter the required pressure setpoint.
- 4. Hysteresis Box**
An input box that is selectable by double-click to enter the required hysteresis value.
- 5. Vent Button**
Vents the compressor.
- 6. Control Button**
Starts the compressor controlling to the set pressure.
- 7. Adjustment Button (inactive until in control mode)**
Stops the control mode but does not vent, so the output pressure is held. Adjustment can then be made to the set pressure, then the output can be changed to the new setting by pressing the control button.
- 8. Com Port**
Drop-down menu to enable selection of the RS-232 communication port of the 7165. Has a "last connection" recall setting so it remembers the previously used com port.
- 9. Connect/Disconnect Button**
Press to connect or disconnect the 7165 communication.
- 10. Exit Button**
Exits and closes the application.

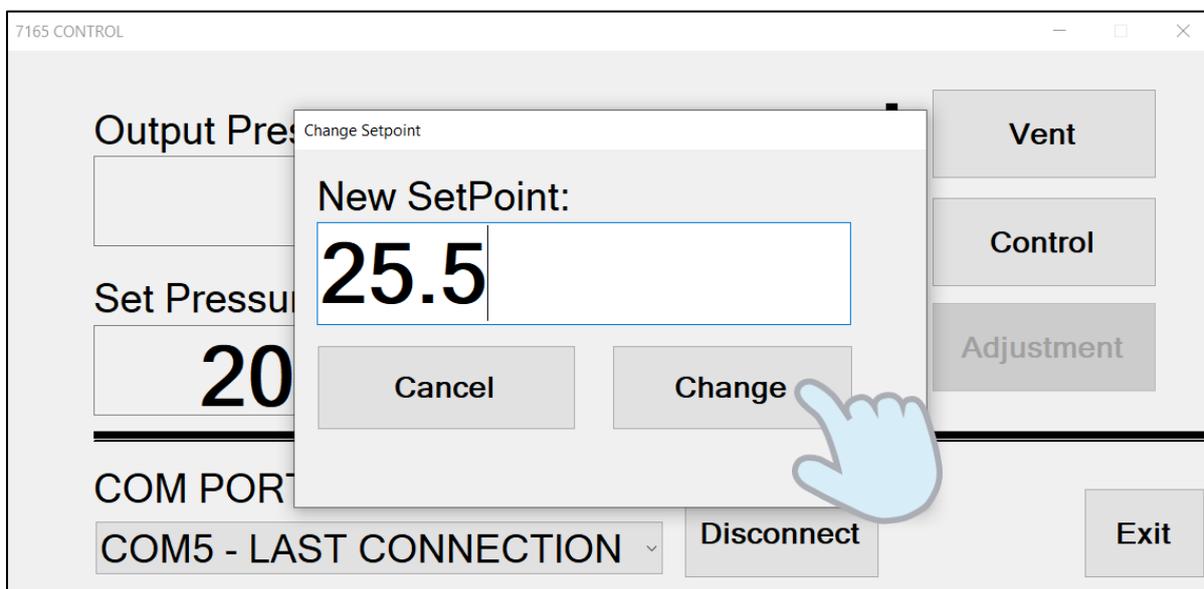
7.3 Setting and Changing a Pressure Setpoint

To set (or change) a pressure double click on the Set Pressure input box.

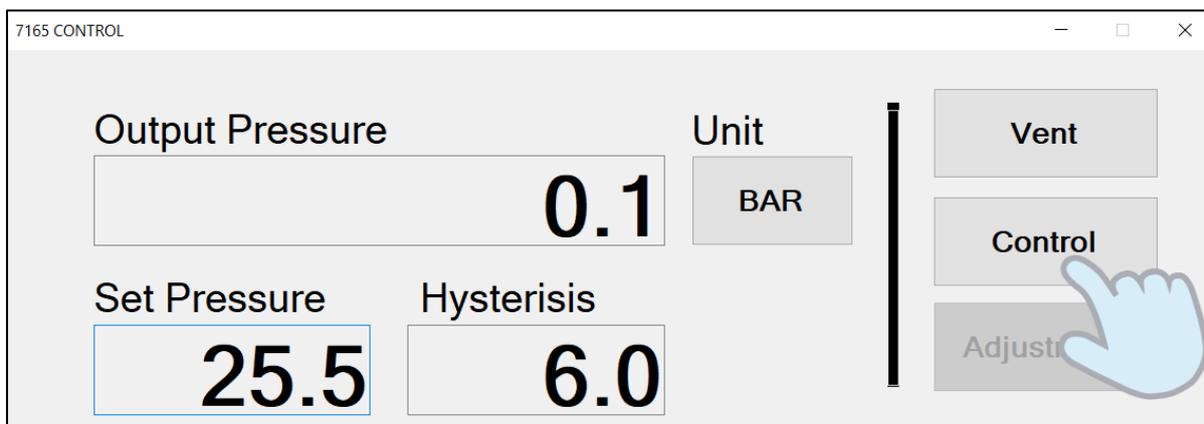


A pop up screen will show and you can enter the new set pressure. Enter the desired value and press the “Change” button.

Note: The input will only accept 1 decimal place (ie 1.1, 20.1, 35.5). If more than one decimal place is entered, the setting will return to it's previous value upon change.



You can now press the “Control” button to output the set pressure.

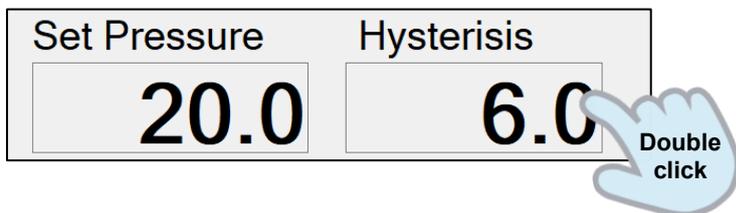


Note: If you change the set pressure whilst the 7165 is already in control mode, the output pressure will instantly adjust to the new setting. Be careful not to over-pressurize the controller or unit receiving pressure.

7.4 Setting and Changing a Hysteresis Value

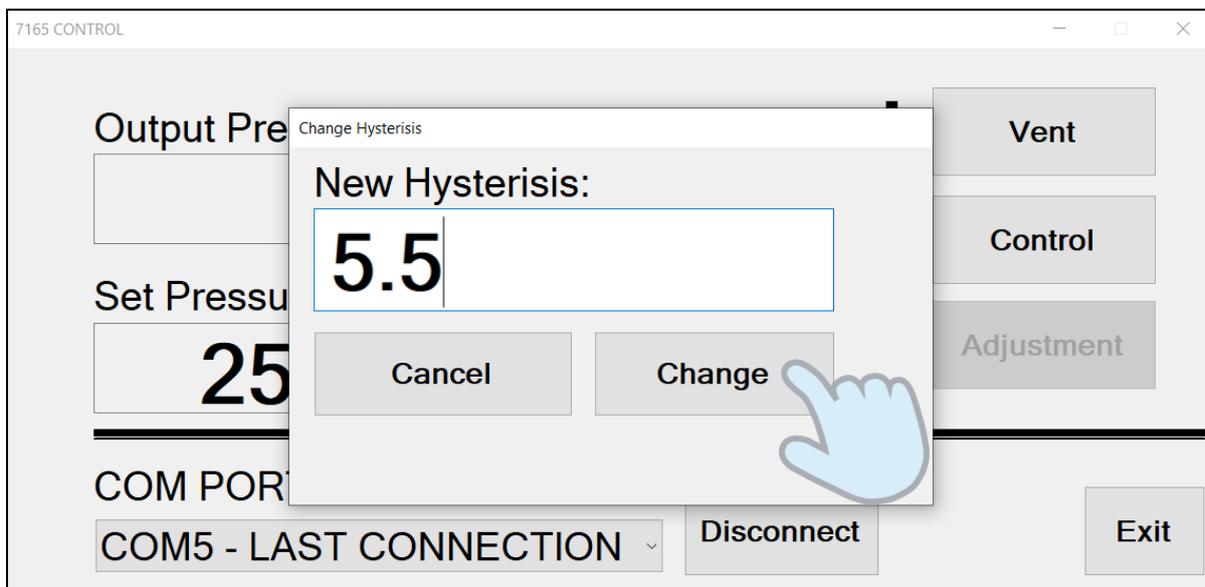
The same method as pressure setting is used to set the hysteresis. Note that this is a value and not a setpoint, so typically it may be a setting such as 1, 2, 3, 4 bar. It is the amount of pressure you let the 7165 drop by before the pump re-starts to pressurize to the setpoint.

To set a hysteresis value double click on the Hysteresis input box.

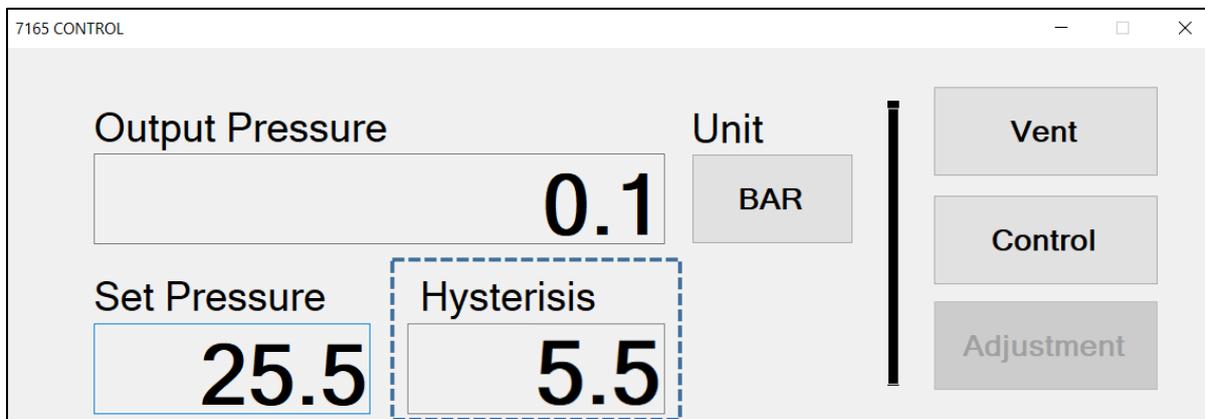


A pop up screen will show and you can enter the new set pressure. Enter the desired value and press the “Change” button.

Note: The input will only accept 1 decimal place (ie 1.0, 2.5, 4.5). If more than one decimal place is entered, the setting will return to it's previous value upon change.

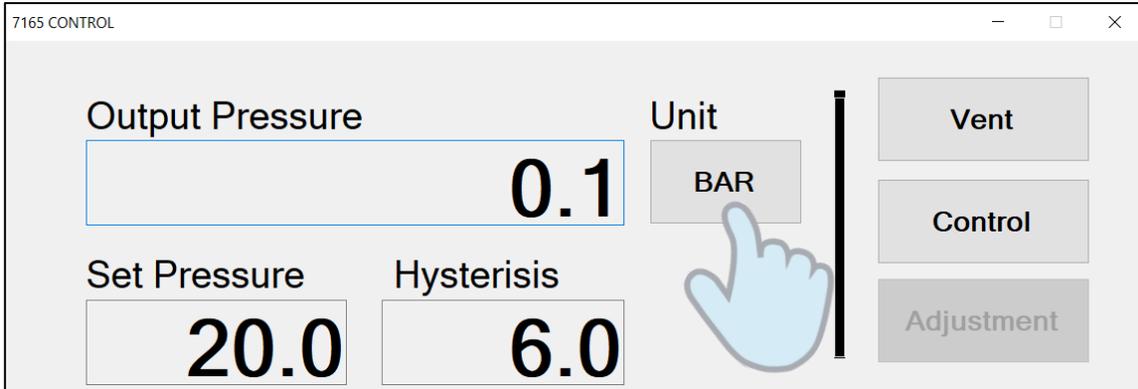


The hysteresis setting will be applied immediately and shown on the display.

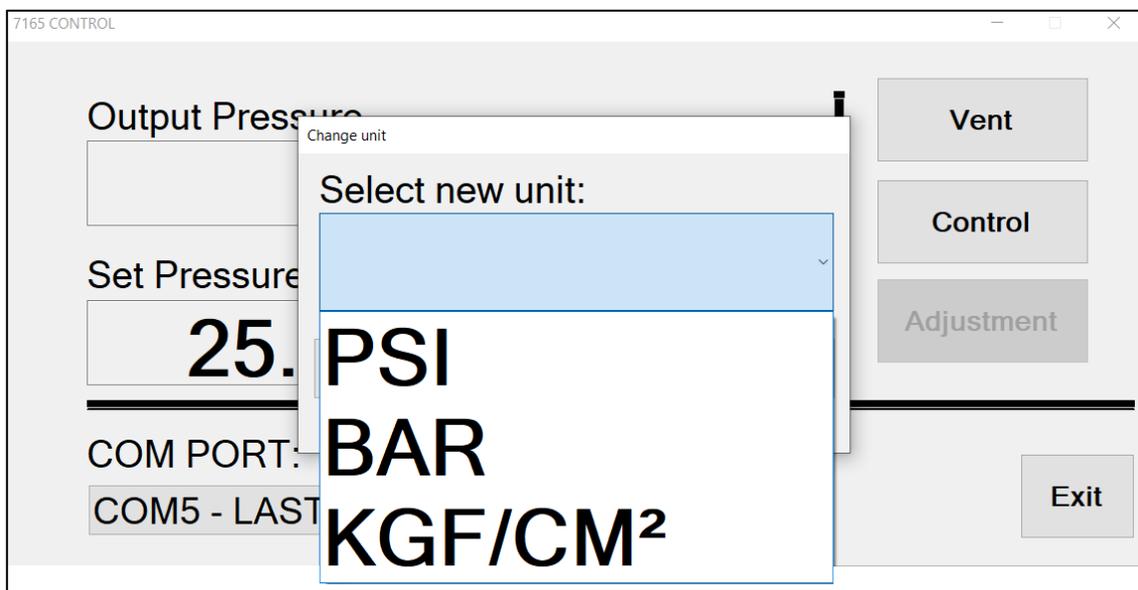


7.5 Setting and Changing the Pressure Unit

To change pressure units press the Unit button.

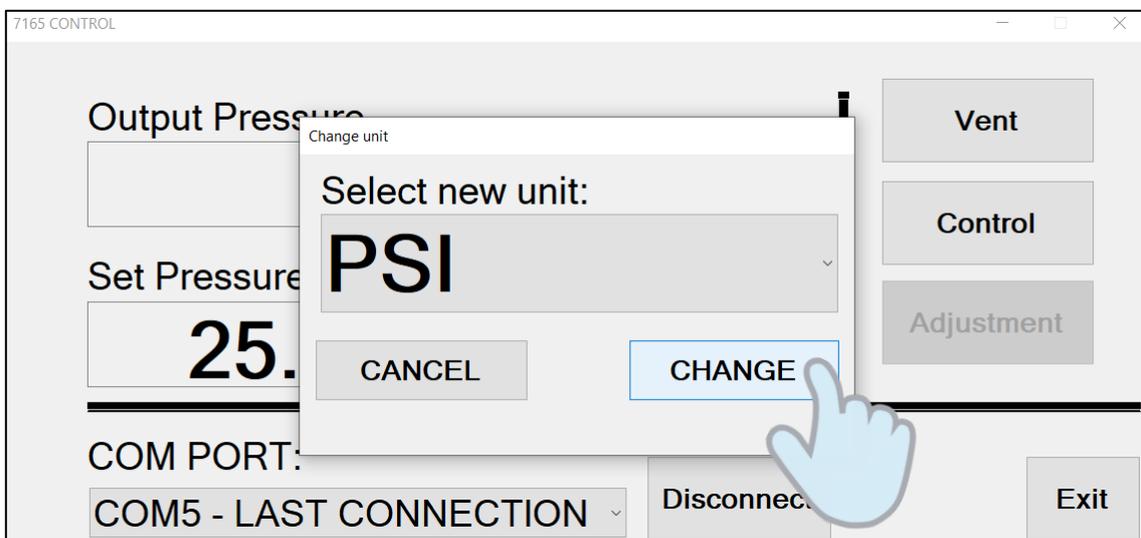


Then select a new pressure unit from the drop-down menu.



There are 3 pressure units available on the 7165, as shown above.

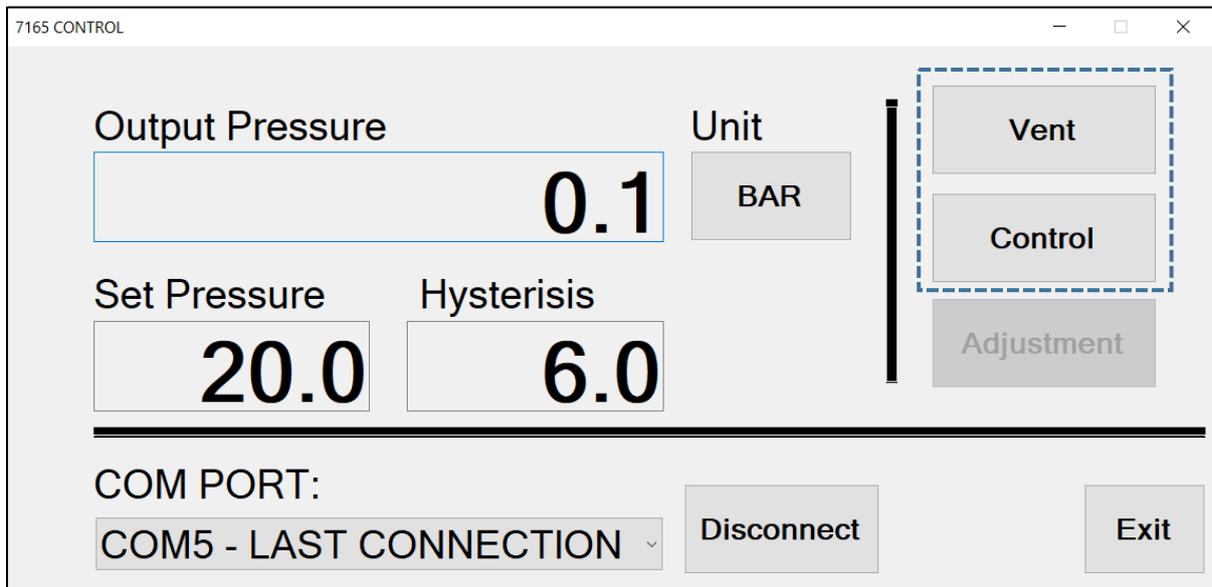
Once selected, press the "Change" button to apply the new pressure unit.



7.6 Controlling and Venting

The control and vent buttons are situated on the right side of the display.

When the 7165 is switched on it performed a vent automatically. So when connecting to the unit via the control application you should be starting in a vented state. The output pressure will display approximately 0.0 (or 0.1 as shown below).



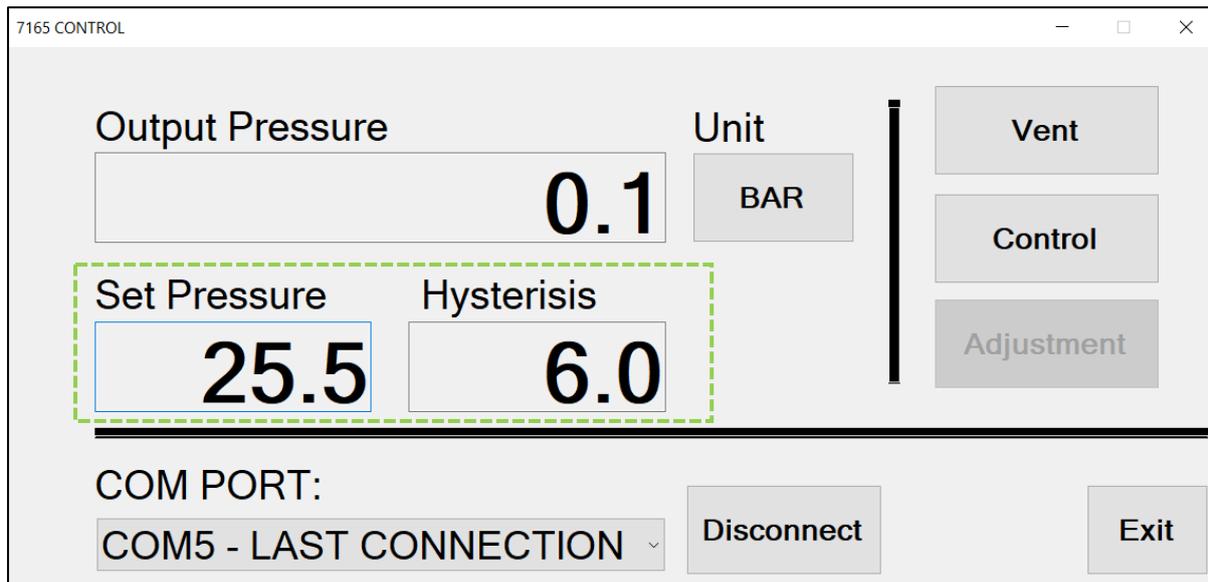
Before using the software application to control pressure from the 7165, you should check the range of your controller (or unit being supplied pressure to). Typically the input pressure requirement is 110% to 120% above the controller range. Here are the settings for common ranges of 8030 and 8030B pressure controllers:

8030 range (highest sensor)	7165 Set Pressure	7165 Hysteresis Setting
10 bar	13 bar	2.5 bar
20 bar	24 bar	3.5 bar
30 bar	35 bar	4.5 bar
40 bar	45 bar	4.5 bar
50 bar	56 bar	5 bar
60 bar	67 bar	6 bar

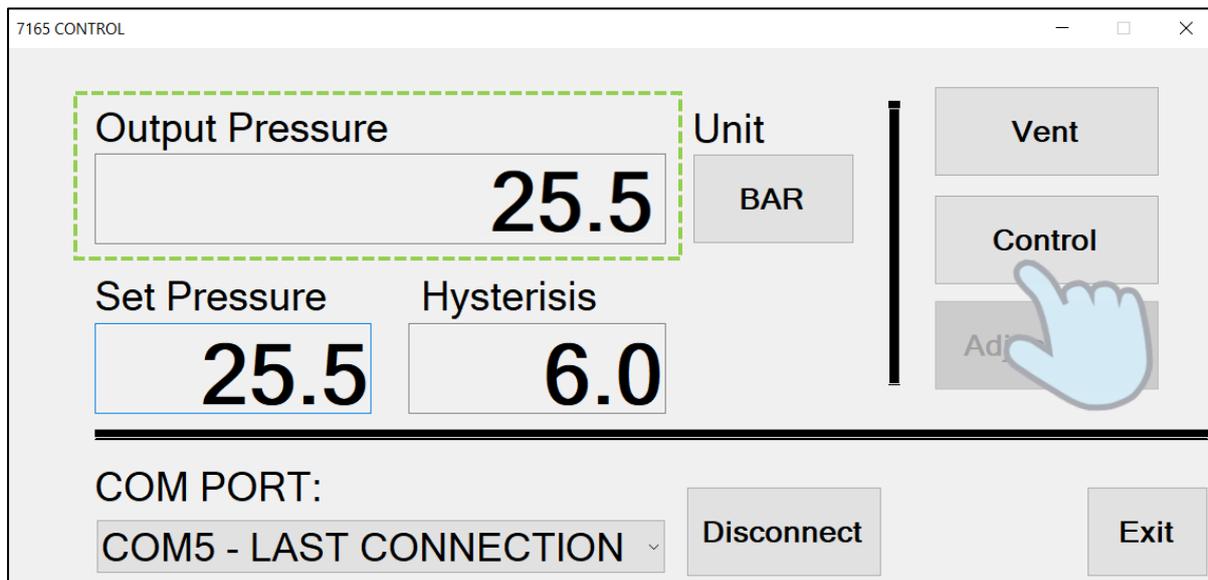
IMPORTANT NOTE:

Do not over pressurize the controller as this may cause damage to the internal measurement sensors and mechanical components.

Once the set pressure is known for the application or controller range, check the setpoint and hysteresis is correct, or change if needed (see section 7.3 and 7.4).



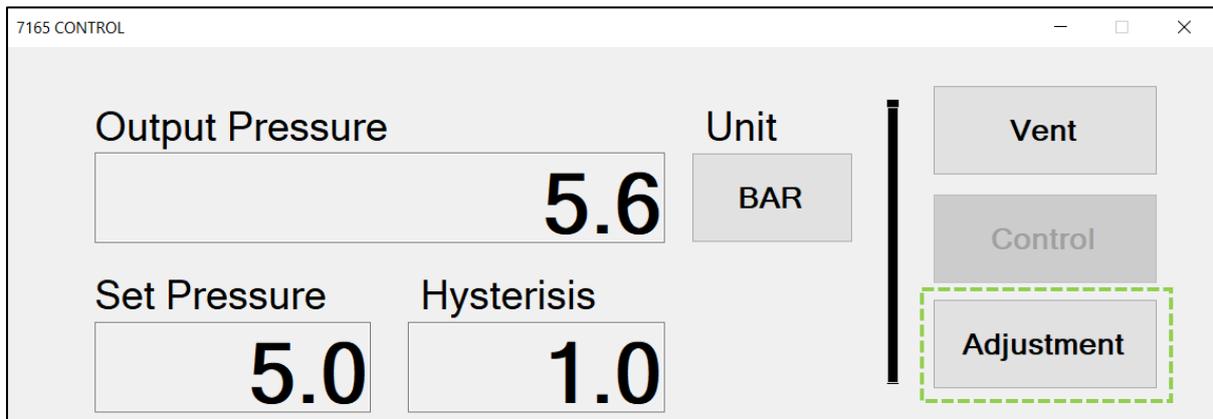
Now you can press the control button and the 7165 Output Pressure display will start to show the pressure increasing until the set pressure is reached.



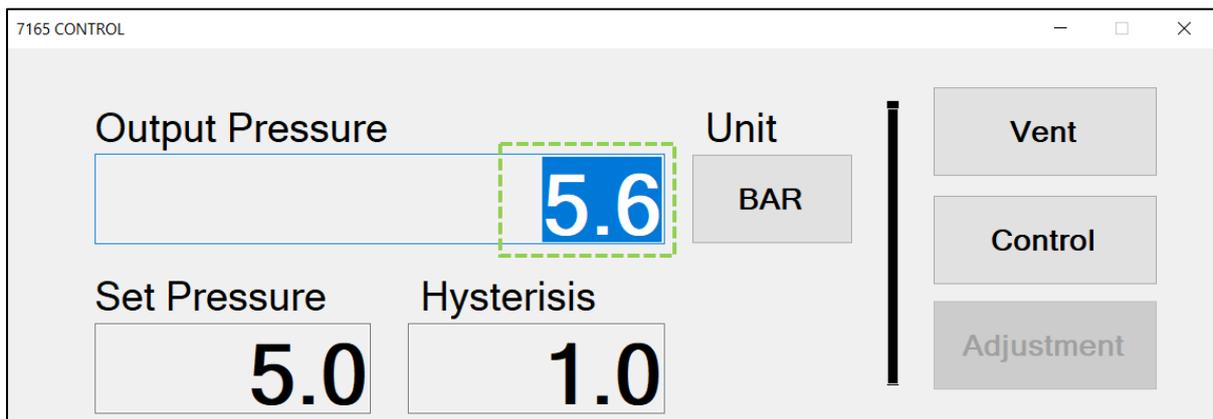
As the controller you are working with uses the pressure from the 7165, the Output Pressure will drop until the hysteresis value below the setpoint is reached, then it will automatically start to pump again until the set pressure is reached.

In this example the 7165 would start to pressurize at 19.5 bar (6 bar below 25.5 bar).

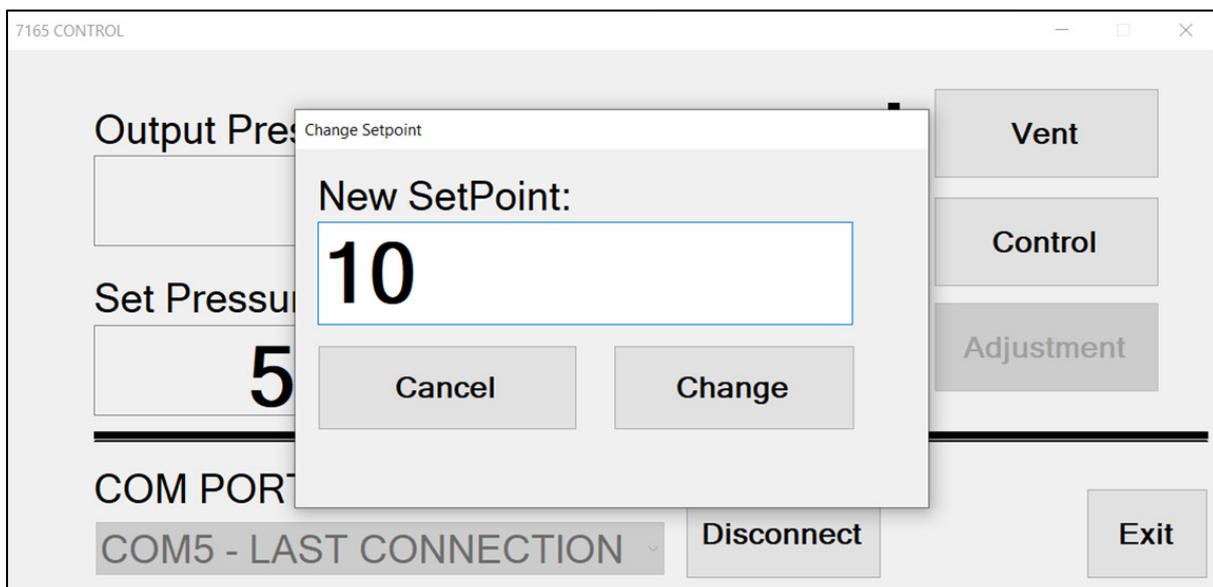
When the unit is in control mode the “Control” button will become inactive. The “Vent” and “Adjustment” button will be selectable. The “Adjustment” button enables the user to stop the control mode without venting the 7165.



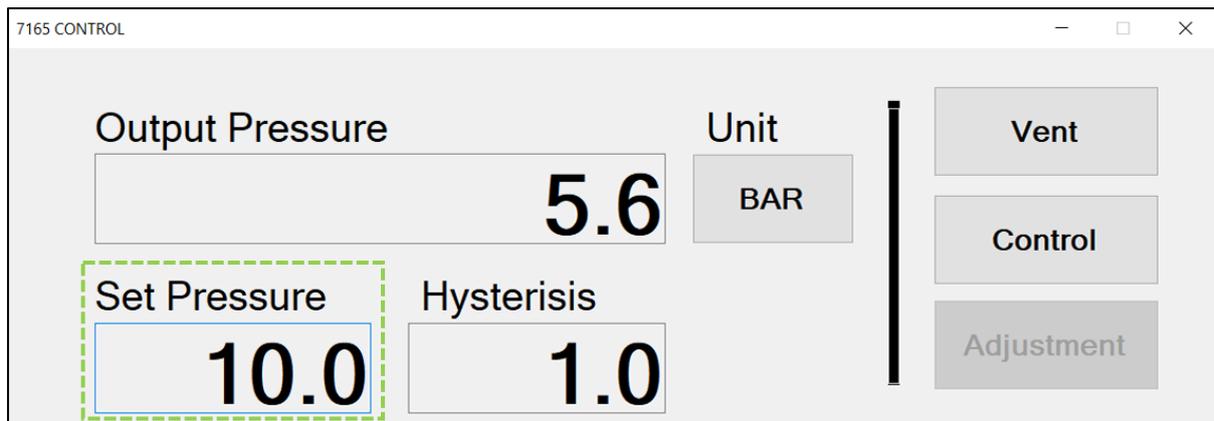
When the “Adjustment” button is pressed the Output pressure will highlight blue to indicate that the output is no longer being controlled to it’s setpoint pressure. Note that if the pressure starts to be consumed whilst in adjustment mode, the output pressure will change and the blue highlight will no longer display. Adjustment of the set pressure can still be made.



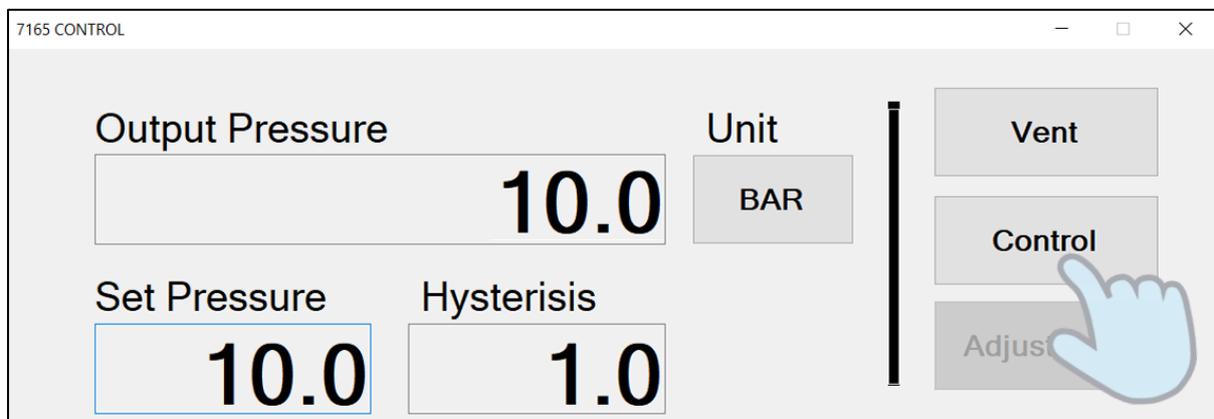
You can then change the set pressure to a new value.



The new setpoint will be displayed in the Set Pressure box.



Now press control to start the compressor controlling to the new setpoint.



Adjustment mode can be useful to stop the compressor output control and observe the behaviour/consumption of a controller or device. It can be utilized when performing a leak test with the 7165.

IMPORTANT NOTE:

Ensure you vent the 7165 after daily use or after the required workload is completed. It should not be left pressurized for prolonged periods. This is for safety to ensure that no pressure remains in the supply line or system unattended. The 7165 should only be operated by qualified and authorised persons.

8 Maintenance

8.1 Replacing the Power Supply Fuse

In case of opening of the fuse, the fuse 6.3 Amp (Delay Fuse 6.3 A / 250 V / 5 x 20 mm) located within the power outlet at the rear may be substituted.

The fuse may open due to a mains voltage surge or an instrument component failure. Replace the fuse once. If a second fuse burns again, it's because the cause is not so simple. In this case, contact Time Electronics technical support.

8.2 Replacing the Compressor Fuse

To replace the compressor fuse, proceed as follows:

1. Turn the fuse holder on the front panel counterclockwise. Try to use a plastic tool to avoid damaging the fuse holder;
2. The fuse holder will be loose, pull it out and remove the fuse;
3. Insert the spare fuse (Delay Fuse 10 A / 250 V / 5 x 20 mm).

The fuse may open due to a mains voltage surge or an instrument component failure. Replace the fuse once. If a second fuse burns out again, please contact Time Electronics for technical support.

8.3 Internal Maintenance and Servicing

Please contact Time Electronics before attempting any servicing work inside the unit. Certain service procedures can be performed with remote supervision from the factory, others require the unit to be sent back to us.

9 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.

Product Registration

You can register your product at: www.timeelectronics.com/contact/product-registration
Registering your product will enable us to maintain a record of purchase for your warranty. You can also use the web form to provide feedback about our products and services.

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.