



STRATAVAC Touch **Operation Manual**



YOU MUST READ THIS MANUAL BEFORE USE

June 2020

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Section 1: Description and Principles of Operation

The DigiVac STRATAVAC Touch is a digital vacuum control instrument that is highly configurable and capable of driving multiple types of sensors (active, passive, and capacitance manometers). It employs a 7" touch screen in order to intuitively display and manage multiple sensors and control points.



Its 4 main operational uses are:

1. **Display Controller:** for 1-4 active and passive vacuum and pressure gauges
2. **Vacuum Controller:** capable of maintaining vacuum by either throttling a vacuum pump or venting gas into a vessel
3. **Relay controller:** capable of turning on/off valves and other gauges based on vacuum level
4. **Internet Telemetry Device:** capable of both monitoring and alerting users

The DigiVac STRATAVAC has many applications from simple passive sensor monitoring to combining multiple sensors in order to create a wide range calibration standard(s) that controls vacuum pump down. It uses a modular building block approach to build the most efficient configuration to achieve a task. For example, two chambers can easily be monitored from the StrataVac Touch if you populate it with two passive driver cards. By default, the StrataVac has a USB input that allows hardwire digital communication that can be used for logging or control. One of the great values of the StrataVac is its extensive sensor compatibility. It works with most active gauges sold on the market today including Inficon, MKS and Pfeiffer cold cathode and Pirani gauges. The StrataVac was built for control and telemetry from the ground up, so

configuring USB, wifi or internet connectivity is a breeze. Below we illustrate 4 common configurations:

Configuration	Why	Example Applications
StrataVac Touch 2 gauge cards, a bleed valve and a throttle valve	Simple and safe way to maintain vacuum during distillation while providing a sweep gas <ul style="list-style-type: none"> • View both condenser and backing pump vacuum measurement • Maintain vacuum level while providing a sweep gas 	A distiller is working to optimize efficiency of process by maintaining a vacuum level while providing a continuous flow of sweeping gas
StrataVac Touch with two gauge cards + two capacitance manometers	Simple and safe way to power and read multiple gauges <ul style="list-style-type: none"> • Easily connect multiple gauges to computer via a single USB cable • <i>Ability to combine 2 capacitance manometers to yield one continuous pressure for the combined ranges</i> 	A firm performing calibrations wants to avoid confusion dealing with different pressure gauges and prefers one combined range.
StrataVac Touch with one gauge card, gauge, throttle valve controller card, and throttle valve	Enables vacuum pressure control using a standard solenoid valve for throttling pump suction <ul style="list-style-type: none"> • User can maintain vacuum levels or change levels • <i>Extends life of pump by enabling pump to run closer to its base pressure</i> 	A botanical processor wants to maintain specific pressure levels in a vacuum oven of about 10 Torr to avoid removing target terpenes while still removing only water.
StrataVac with one gauge card, gauge, bleed valve controller card and VacStable bleed valve with wireless feature	Enables vacuum pressure control using a small bleed valve <ul style="list-style-type: none"> • User can maintain vacuum levels or change those levels, and its PID response • <i>You can surf over to your gauge, adjust set points and view your process progress anywhere there is internet</i> 	In order to help a manufacturer control their freeze drying process better, they implement this StrataVac configurations to maintain 300 millitorr in batches to improve consistency, and will always be able to view process status from their cell phone.

Versatility Within Your Reach

The StrataVac Touch is configured with sensors based on the accuracy and range required to sense vacuum and display the pressure reading in user selectable units of: Torr, mbar, kilopascal or millitorr. The DigiVac StrataVac Touch can be panel mounted or sit on a bench top. It has an extensive support matrix that includes most capacitance manometers, active and passive gauges available from Lesker, Agilent, Inficon, MKS and Setra. A support matrix is available in Section 8.

In order to achieve this versatile functionality, the StrataVac has a modular building block approach that allows the user to select the hardware necessary for their particular application.

Section 2: Construction

Components of the StrataVac Touch Unit include:

- The control box that all of the gauges, valves, display and telemetry interface to. It also includes bracket for display mounting. There are 6 slots, 1 display, 1 micro-USB 1 analog out, and a power connection in the back of the StrataVac Touch.



- The display mounted in an aluminum enclosure with a 90 degree adjustable lab stand bracket for mounting on the control box and 3 foot display cable
- 24 volt power supply
- At least one gauge, gauge card and 10' gauge cable.

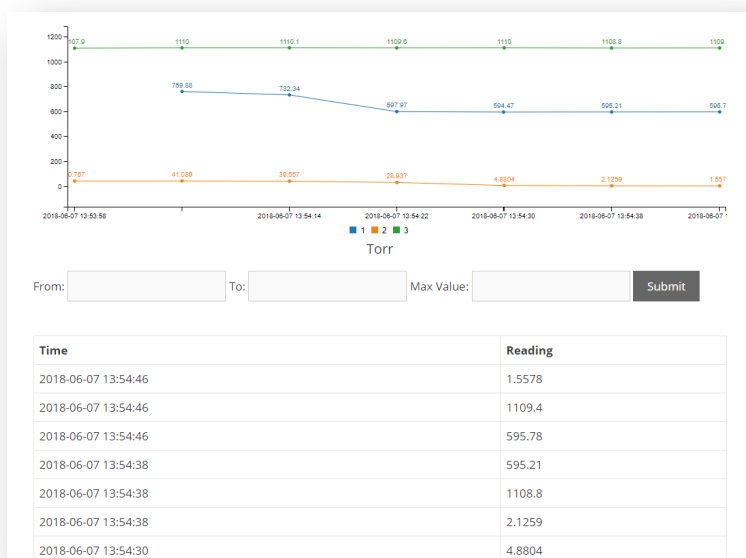
The instrument is housed in a rugged aluminum enclosure. It can either be placed on a desktop, lab top surface or installed on a laboratory stand with optional lab mount.

In general, a working StrataVac configuration consists of:

Basic StrataVac Touch Controller: includes a 7" touch display, Aluminum control box, Micro-USB port, a 10 volt analog output port and a 24 volt power supply.

Configurable Options Chosen Based on Application Needs:

1. Between 1 and 4 active gauges or capacitance manometers
2. Between 1 and 4 standard 5 volt sensors, such as DigiVac's 775i
3. Between 1 and 4 passive gauges.
4. Up to 2 valve control cards to control up to 2 valves for isolation or vacuum control, or to apply a bleed to maintain a vacuum level.
5. The ability to control up to 2 type "C" relays
6. A wifi card that enables connecting to your gauge via wifi or telnet and enables connectivity to the vacuumnetwork.org cloud monitoring service.



Consult the DigiVac website www.digivac.com for information about other DigiVac vacuum controllers and gauges.

Section 3: Unpacking and Inspecting

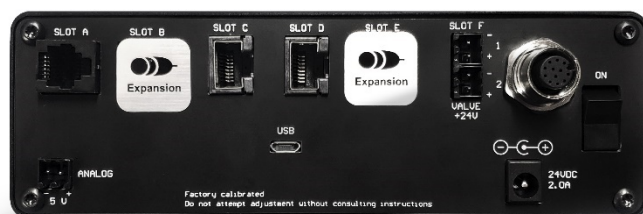
After the instrument is received, it should be carefully unpacked and inspected for damage during shipment and to confirm that all components are present. The Display Unit warranty pertains only to the instrument, and does not cover losses in shipping.

Each StrataVac Touch should come with:

- Display and cable
- Main control box
- 10' Sensor cable with modular plugs that mate with the ordered driver cards
- Power Supply
- Quick Start Guide

Section 4: Installation

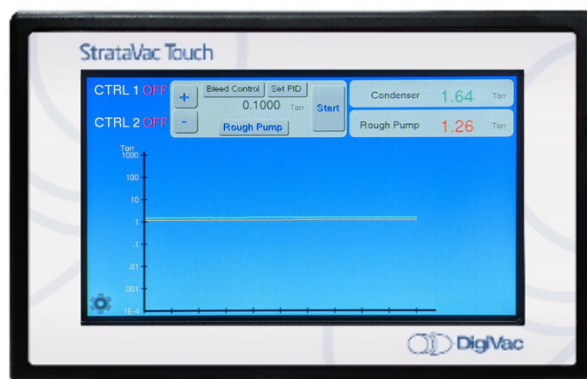
The instrument should be placed in a clean, dry environment for best results. The control unit can be placed on a desktop with the rubber feet resting on the table surface. Lastly, the StrataVac can be mounted on a lab pole or lattice system using the optional pole clamp. The display can be mounted onto a laboratory pole clamp, or on the control box itself. The gauge tube cable should be identified by wire tags or markings specific to your environment.



The controller box can be connected to a computer with a standard micro-B USB cable. The software will automatically download and install. You can then open a simple telnet program like PuTTY and issue commands to read vacuum and assign set point values. Please use the supplied AC adapter with your instrument. This adapter provides clean short protected power to protect and insure proper functioning of the internal circuitry.

Menus

Below is a picture of the home Screen.



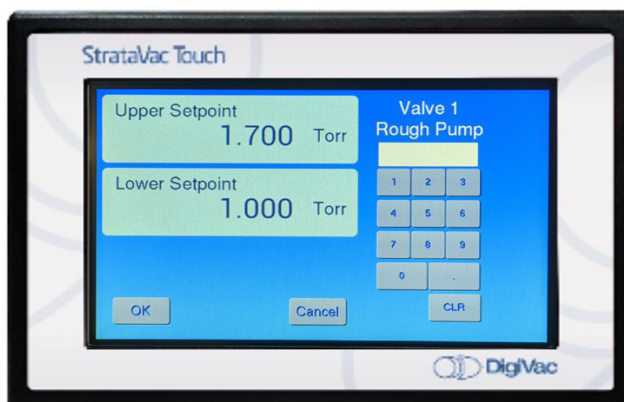
The unit is pre-configured for the available features ordered. Below is a screenshot of a unit that has 2 sensors, 2 valves and a bleed configured:



By default, the bleed valve and valve1 are assigned to the sensor connected to slot A. Valve 2 and Relay 4 are assigned to the sensor connected to slot B. The sensors can be assigned several names to enable intuitive identification.

The Touch screen enables very simple user interaction:

- Using the keypad, type in the setpoint you would like for Upper control, then click on the upper setpoint box. Press Clear, then type in the number you would like for Lower setpoint control and click on the lower setpoint box to set that value.



- In order to change the name of the sensor, simply click on the sensor from the home screen and toggle to the desired name.
- In order to display large numbers instead of the default small numbers and graph, simply click on the configuration icon (lower left) and then go to view settings, from which the view can be toggled for graph view or sensor view.
- Changing PID parameters is available from the PID control screen, found on the configuration screen.
- Changing graph speed is available from the Graph Speed screen.
- Changing measurement units is available from the change unit screen



Configuration

The StrataVac can have one, two, three or four sensors configured. Make sure the sensors, cables and slot are labeled and named so that someone less familiar with the system can easily understand what measurement they are looking at.

Additionally, in certain cases sensors may be combined in order to achieve a combined virtual sensor composed of 2 or more sensors.

Capacitance Manometer Combination Options	
Combination Driver	Sensors combined
2CM	0.1 Torr + 10 Torr
2CM	10 Torr + 1000 Torr
3CM	0.1 Torr + 10 Torr + 1000 Torr

At all times, all current sensor readings are available to their assigned relays, valves and set points; to the network and to USB.

Section 5: Operations

After installation, the Display Unit is ready for immediate operation. NEVER DISCONNECT SENSOR OR OUTPUT WIRES WHILE UNIT IS POWERED UP. Only connect and disconnect cables with the power to the unit unplugged. Make all connections to sensors and relay outputs with the power disconnected.

In cases where the system has contaminants (i.e. in metalizing and coating applications), it is often effective to isolate the sensor with a solenoid or manual valve when contamination is most active.

To Use the StrataVac Touch with relays:

Install the StrataVac and the sensor in the vessel closest to the pressure that you care about. Next, wire in the valves.

The set point connections are in the back of the unit. There are 2 rows of pins. The top row of pins is for set point 1, and the bottom row of pins is for set point 2. The top 3 pins are in the order:

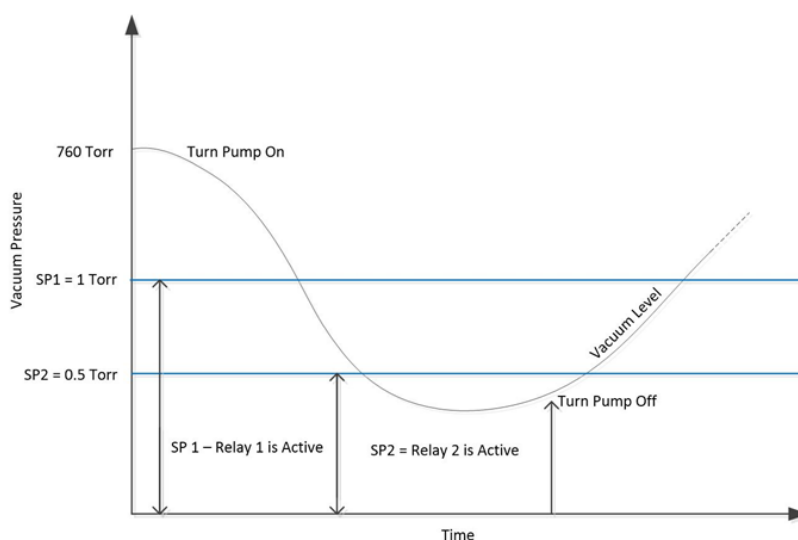
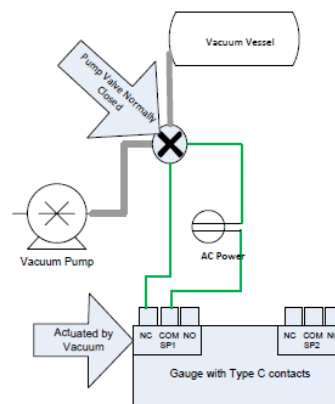
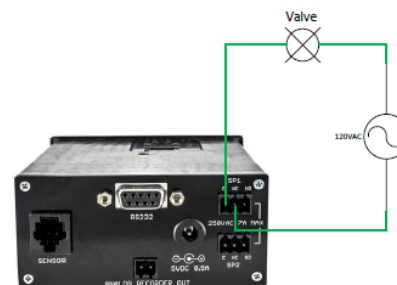
1. Common – The common line of a switch

2. N.C. – Normally closed. This means that above the set point value there is a current path between the common and the N.C. terminal. Put another way the switch is “ON” between these 2 terminals. At the set point value and below (higher vacuum, lower pressure) the connection is open. Put another way, the switch is “OFF” between the common and the N.C. connection at higher vacuum (a lower pressure reading).

3. N.O. – Normally open. This means that above the set point value there is no current path between the common and N.O. connection. Put another way the switch is “OFF” between these 2 terminals. When the vacuum indication goes below the set point value (higher vacuum, lower pressure) the current path closes. Put another way the switch is “ON” between the common and N.O. connections at absolute pressure readings below the set point value.

Take care to insure that the wire connections are made fast, and the voltage and current does not exceed 250V or 7A. If you need to control a device that draws more power (like a vacuum pump or heater), consider another relay in between the DigiVac output and the device to be controlled.

Below is a description of how relays act as a function of vacuum level.



To Use the StrataVac Touch as a Throttle Type Regulator:

By default the StrataVac will have 2 ports to drive 2 valves on the throttle regulation card. Note the top port is where valve 1 would be connected, with associated set points:

- **U1 – for valve 1 upper set point**
- **L1 - for valve 1 lower set point**

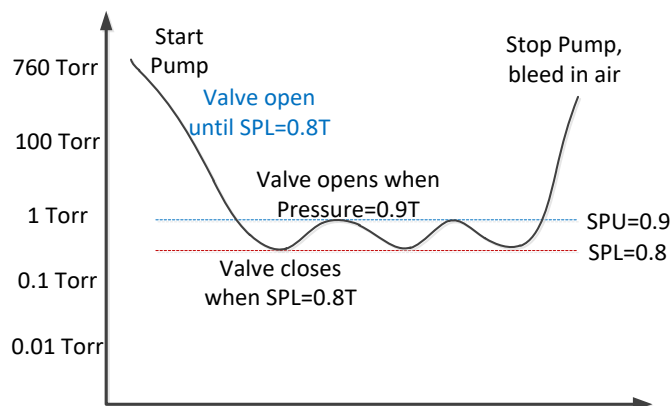
By The bottom port is where valve 2 would be connected, with associated set points:

- **U2 – for valve 2 upper set point**
- **L2 - for valve 2 lower set point**

Next, plumb the valves in and configure your set points:

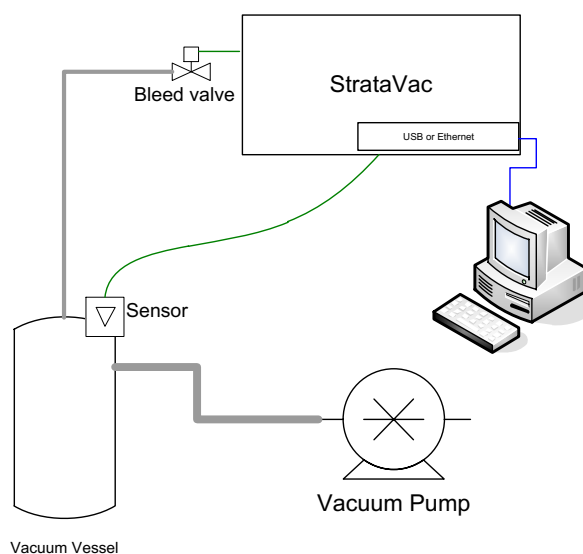
1. Install valve between pump and vessel. Note the Valve in regulation mode is powered directly by the StrataVac, unlike standard relays (which require wiring to an AC or other power source)
2. Install sensor near the vessel **to be controlled**
3. Set upper and lower set points
 - a. Click “control 1” to adjust valve 1
 - b. Enter value on keypad and then click on the box corresponding to Upper setpoint
1. Press clear then enter the value on the keypad for Lower setpoint 1.Repeat for lower set point
 - c. Repeat steps valve 2 if you wish.
4. Observe control and adjust as necessary

The StrataVac vacuum regulator enables maintaining a vacuum pressure between two set points. The StrataVac directly powers a 24 volt valve (1 amp or less) by opening a valve until the lower set point is reached, then closing the valve allowing the system to leak up to reach it's upper set point. When it reaches the upper set point, the valve will open again. Using upper and lower set points is an easy way to manually define the Hysteresis – that acceptable or desired pressure range to control at. The smaller the Hysteresis, the more cycling of the valve but the tighter the control.



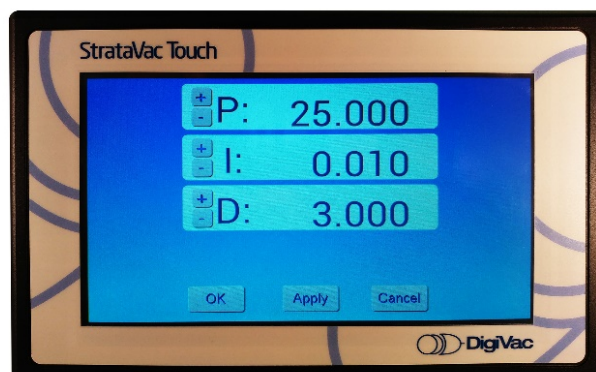
StrataVac for mass flow type gas delivery or upstream vacuum control:

The StrataVac can use venting to either provide a specific flow rate into a chamber, or to maintain a vacuum level by bleeding gas into a chamber. Venting for a specific flow rate (such as 75 sccm) can be achieved through setting the bleed control to flow, and then by manually using the slider bar to set a specific flow rate. Pressing Start starts the flow at the specified level. Pressing stop closes the VacStable valve and isolates any gas flow to the system. Additionally, you can press the bleed button, and enter in a specific flow rate.



To get to the PID tuning variables, enter the configuration menu by selecting the gear in the lower left:

- Click on PID
- Set the variables by toggling to the desired numerical value using the plus and minus button.



PID overview:

PID control is largely used in industry, and refers to the variables in the control equation “proportional,” “integral,” and “derivative.” For a PID primer, refer to http://en.wikipedia.org/wiki/PID_controller

- **P:** is implemented as a proportional gain (not as a proportional band). Larger values of P yield smaller error with less stability. The range is 0.01 to 99.99 with units of %.
- **I:** is also a gain. Larger values of I will yield faster response with less stability. The range is 0.00 to 99.99 with units resets/minute
- The **D** Range is 0.00 to 99.99 with units of minutes.

Here are the recommended PID tuning steps:

1. To Start

- Start with P=0.14, I = 0.08, d=0 S=Set Point (1 Torr default), O=0030
- Increase “O” in increments of 5 until the vacuum level is maintained at ½ Set Point.
- Increase “P” until oscillations observed at about 10% of average reading (not Set Point.. the reading will likely still be lower than set point)
- Set P=P/2 (half the oscillation value of “P” obtained above)
- Start with I=P/4 (at this point the vacuum level should be approaching the set point)

2. Tuning

- If oscillations are greater than desired, decrease “P” 10-20% at a time
- If Vacuum Level is less than the set point, increase I in increments of 20% until convergence at the set point

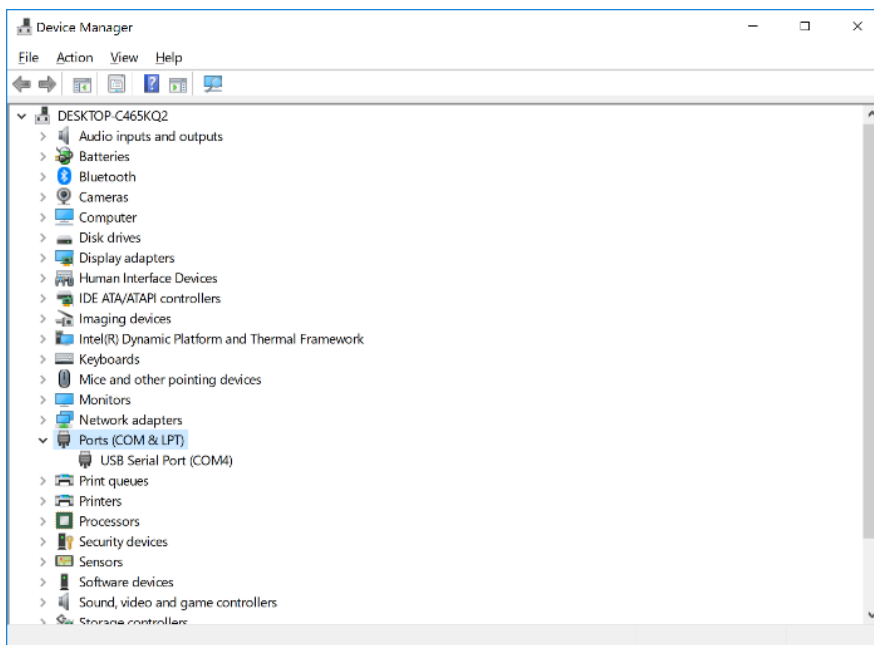
3. Rules of thumb

- a. If the vacuum level is below the desired set point with maximum values of P & I, then increase "O"
- b. If greater then preferred oscillations are occurring when $I > P$, try setting $I = P$
- c. If greater then preferred oscillations are occurring about a set point and $P < 1$, reduce "O"

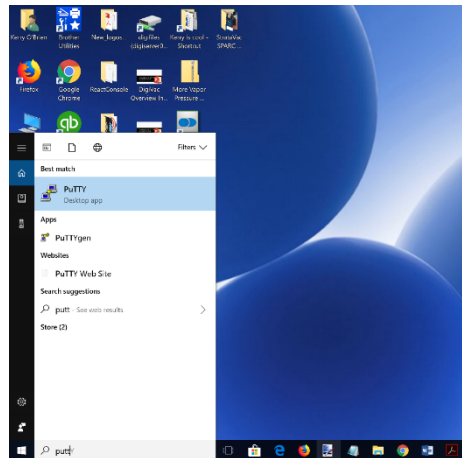
Communication: USB Connectivity

StrataVac has the ability to display vacuum readings on a desktop in real time. To view your vacuum pressures on your desktop, you first must download [PuTTY](#). Once the software is installed on your computer, follow the instructions on the next page.

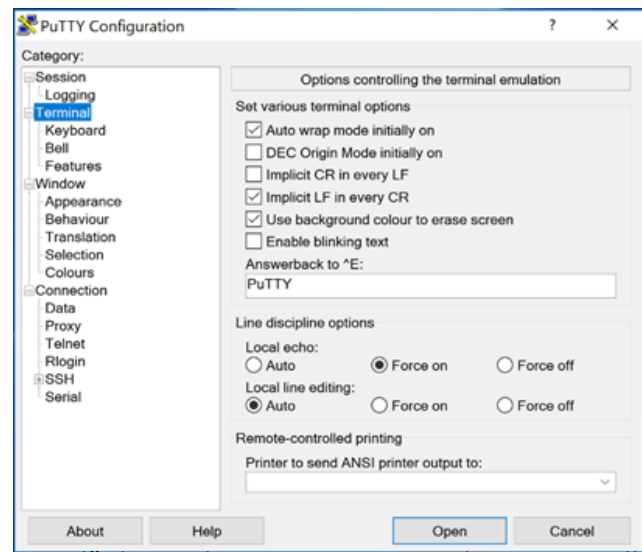
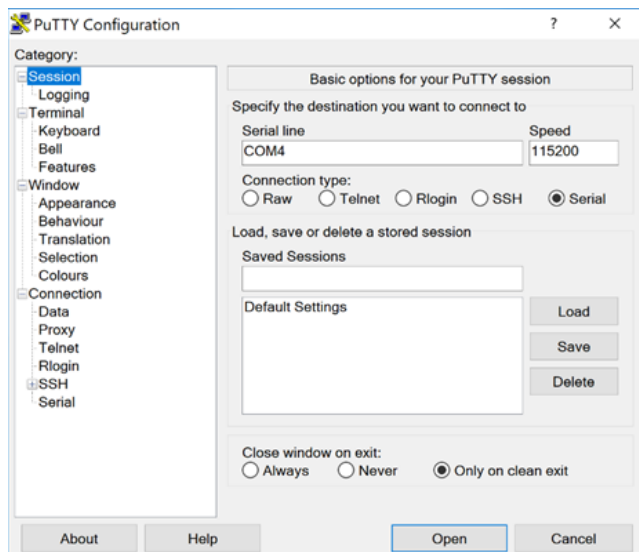
1. Go to your device manager and review your COM port



2. Open PuTTY on your desktop



3. Select “serial” as your connection type and set the speed to 115200



4. Under “Category” on the left, select “terminal” then select various terminal options. Still on this screen, select “force on” as the Local echo line display. Click open.


```

192.168.0.30 - PuTTY
VAC1=388.0400 VAC2=759.4022 VAC3=750.2184 SPU=5.1400 SPL=2.0700
VAC1=389.0471 VAC2=759.4535 VAC3=746.6561 SPU=5.1400 SPL=2.0700
VAC1=388.8254 VAC2=759.3777 VAC3=757.1195 SPU=5.1400 SPL=2.0700
VAC1=388.9439 VAC2=759.3167 VAC3=758.1550 SPU=5.1400 SPL=2.0700
VAC1=389.2839 VAC2=759.3090 VAC3=761.3547 SPU=5.1400 SPL=2.0700
VAC1=389.5392 VAC2=759.3141 VAC3=760.0190 SPU=5.1400 SPL=2.0700
VAC1=389.6327 VAC2=759.3843 VAC3=758.7595 SPU=5.1400 SPL=2.0700
VAC1=389.9755 VAC2=759.2949 VAC3=759.7053 SPU=5.1400 SPL=2.0700
VAC1=390.0746 VAC2=759.3066 VAC3=757.0053 SPU=5.1400 SPL=2.0700
VAC1=390.7358 VAC2=759.4776 VAC3=759.0011 SPU=5.1400 SPL=2.0700
VAC1=390.6849 VAC2=759.4129 VAC3=757.2856 SPU=5.1400 SPL=2.0700
VAC1=390.4573 VAC2=759.2279 VAC3=760.3283 SPU=5.1400 SPL=2.0700
VAC1=391.0159 VAC2=759.3619 VAC3=773.2523 SPU=5.1400 SPL=2.0700
VAC1=391.1296 VAC2=759.3077 VAC3=768.7596 SPU=5.1400 SPL=2.0700
VAC1=391.5724 VAC2=759.3403 VAC3=770.7045 SPU=5.1400 SPL=2.0700
VAC1=391.4987 VAC2=759.2391 VAC3=764.3661 SPU=5.1400 SPL=2.0700
VAC1=391.7511 VAC2=759.2485 VAC3=771.5813 SPU=5.1400 SPL=2.0700
VAC1=392.4893 VAC2=759.3641 VAC3=765.1457 SPU=5.1400 SPL=2.0700
VAC1=392.5623 VAC2=759.2724 VAC3=764.1800 SPU=5.1400 SPL=2.0700

```

5. View your vacuum on your desktop!

StrataVac "Cheat Sheet"

SENSOR AND VALVE CONTROLS

Sensors:

```

A? . . . . . Get all the sensor device info
A1? . . . . . Get sensor 1 device
A2? . . . . . Get sensor 2 device
A3? . . . . . Get sensor 3 device
A4? . . . . . Get sensor 4 device

```

```

Vac? . . . . . Get vacuum reading of blended gauge. See note below.*

```

*This is only applicable if using a blended gauge

```

Vac1? . . . . . Get vacuum reading of sensor 1
Vac2? . . . . . Get vacuum reading of sensor 2
Vac3? . . . . . Get vacuum reading of sensor 3
Vac4? . . . . . Get vacuum reading of sensor 4

```

Bleed Valves:

```

P? . . . . . Get the P term
P=2.35 . . . . . Set the P term
I? . . . . . Get the I term
I=16.78 . . . . . Set the I term
D? . . . . . Get the D term
D=8.07 . . . . . Set the D term

```

```

SPB? . . . . . Get control setpoint for bleed valve
SPAB? . . . . . Get control device for bleed valve
SPB = 10 . . . . . Set the bleed control point to 10

```

Throttle Valves:

SP1U? Get the upper setpoint for Control 1
 SP1U=1 Set the upper setpoint at 1
 SP1L? Get the lower setpoint for Control 1
 SP1L=.2 Set the lower setpoint at 0.2

SP2U? Get the upper setpoint for Control 2
 SP2U=1 Set the upper setpoint at 1
 SP2L? Get the lower setpoint for Control 2
 SP2L=.2 Set the lower setpoint at 0.2

UNITS, TIMING, MODE AND MORE VALVES

More Valve Controls:

SPAT1? Get control device for Control 1
 SPAT2? Get control device for Control 2

SPA1? Get control device for Control 1
 SPA2? Get control device for Control 2
 SPA3? Get control device for Control 3
 SPA4? Get control device for Control 4

SPF? Get SCCM of flow
 SPF=100 Set flow to 100 SCCM

SPS? Get setpoint for Dinamo Valve
 SPS=10 Set setpoint for Dinamo Valve

Units:

U? Get the current units. See below for information on response.*

*Response will be "U=0", "U=1" or "U=2". 0 = Torr, 1 = mBar, 2 = kPa

U = 0 Set the units as Torr
 U = 1 Set the units as mBar
 U = 2 Set the units as kPa

Timing:

T? Get the current data rate for DVCUP
 T = 0.25 Data will be sent 4 times per second
 T = 1 Data will be sent 1 time per second

Mode:

M? Get the current mode for DVCUP*

*The mode can either be Automatic, in which data is sent at the specified T rate, or Manual, in which data is only sent when queried.

M = A Data will be sent automatically at the specified T
 M = M Data will only be sent when queried

Section 6: Control Options

DINAMO | Overview

The DINAMO Valve Module is one of the latest innovations by DigiVac. It is two valves within one module, giving operators twice the control. Each valve is a stepper motor controlled proportional bellows valve that can be opened up fully for maximum throughput, or can be opened very slowly for precise control.

- **Pump Side:** One side of the valve will be connected to a vacuum pump in order to modulate the suction to a vessel. The internal vacuum flow paths have a minimum internal diameter of 20mm.
- **Vacuum Side:** The vacuum side of the DINAMO has a minimum orifice size of 12.5mm - which is sufficient conductance to pull most systems well down into the medium vacuum region.
- **Bleed Side:** The bleed side of the valve has a minimum orifice size of 1/4", which is generally sufficient to bring larger systems greater than 100 Liters up to Atmosphere.

This valve is ideal for low-vacuum processes. Some of the top benefits of this valve include: precise control, quiet flow control, low power, better pump down, and higher throughput. It can be used for soft start, throttling and isolation. Furthermore, it can be used to gently bleed air to bring a vessel back up to atmospheric pressure to avoid disturbing or making the contents of the vessel turbulent.

DINAMO | Unpacking and Inspecting

After the instrument is received, it should be carefully unpacked and inspected for damage during shipment and to confirm that all components are present. The Display Unit Warranty pertains only to the instrument and does not cover losses in shipping.

Each DINAMO comes with:

- Dinamo Valve with two KF25 fittings and a hose barb, two cables to plug into apollo
- Apollo w/ Display and black box main unit
- 24V power supply
- 775i Sensor (installed in Dinamo valve) and M12 4 pin sensor cable

DINAMO | Installation

Locate the valve in a clean and dry environment for best results. Hooking the DINAMO up to a system is a simple, two-step process:

1. Take the hose connected to your pump. Make sure the hose ends in a KF25 fitting. Using a clamp, attach the hose to the port labeled "To Pump".
2. Take the hose coming off of your system, it should also end in a KF25 fitting, and attach it to the port labeled "To System".

Now, it's time to set up the Apollo:

1. Connect the Dinamo valves to the Apollo according to the labels on the ends of the cables. The cables plug into the back of the black box unit. Cable ends are marked "T" and "B", "T" connector (Top) goes into the top slot of the valve card, "B" connector (Bottom) goes into the bottom slot of the valve card on the rear of the unit.
2. Plug the 775i sensor into the Apollo main unit using the provided cable. There are two M12 style cables, make sure you are using the 4 pin sensor cable. You have to push the cable down and turn (clockwise to install) at the same time. Cable is keyed to prevent incorrect insertion.
3. Connect the display to the main unit using the 12 pin M12 cable. Push and turn at the same time, cable is keyed for alignment.
4. Connect the main unit to power using the 24V power supply and power on the unit by hitting the switch in the back

DINAMO | Controlling with DINAMO Valve

After installation, the unit is ready for immediate operation. This section will go over how to operate, and control, with your DINAMO Valve.

The Dinamo valve offers a few different control features. One feature you have is to control at a setpoint. There are also three other modes of operation you can put the Dinamo Valves into.

CLOSE

This closes both vacuum and bleed valves.

ATM

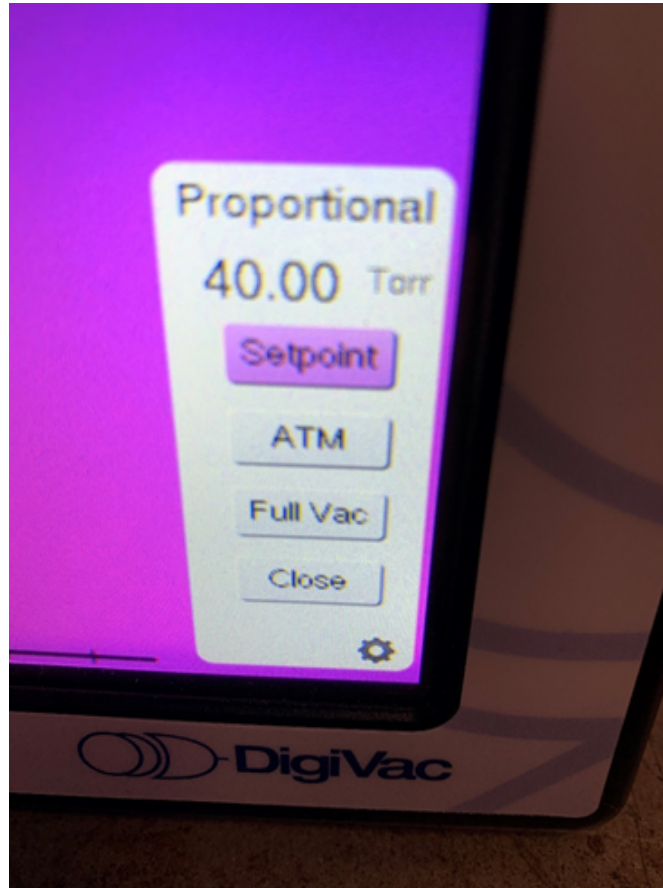
This closes the valve on the vacuum side and opens the valve on the bleed channel venting the system up to Atmosphere.

FULL VAC

This closes the bleed channel and opens the vacuum channel allowing you to fully pump down your system.

Controlling at a setpoint

1. You can either be controlling in setpoint mode or in one of the modes outlined above. The button highlighted on the screen is the mode you are in. Shown Below.



The number is the current setpoint. This shows we are currently in setpoint mode controlling at 40 Torr.

2. Click on the setpoint button and you will be brought to a setpoint adjustment screen
3. Type in the setpoint value you would like to achieve, then click on the setpoint box on the left hand side of the screen. You will see the number move into the setpoint box. Press save to save this setpoint. When you return back to the main screen you will see the updated setpoint in the Proportional box on the screen.
4. You are now ready to begin controlling.

DINAMO | Communicating with the Apollo

The Apollo will come configured to connect your wireless network. Communicating with the Touch will require only a few steps

1. Search for a wifi network called "K19E22"
2. Connect to it and navigate to 192.168.4.1 using a web browser
3. Go to IP Address and note the IP Address provided by the unit. If not provided, contact DigiVac.
4. Connect back to your own wifi.
5. Open up Putty and select telnet
6. Enter in the IP Address provided by the unit and then click start.
7. A terminal window should open at this point with communication from the device streaming across.

DINAMO | Specifications

Range of control	5 millitorr to 800 Torr
Accuracy, control	+/- 5% of reading
Time to converge within 5% after disturbance	<30 seconds
Integral sensor	SEN-775i
Integral Sensor Accuracy	+/- 2 Torr
Integral Sensor range	0.5-775 Torr
Power	4 wire unipolar stepper drive
Enclosure	Open
Certifications	CE, UL, CSA

Section 7: Factory Repairs and Calibrations

The vacuum gauge assembly is designed to provide years of trouble-free service, and the liberal internal use of plug-in components make it easily repairable. No field servicing of the unit is recommended, other than replacement of the gauge tube, but factory servicing and calibration are available at a nominal cost.

We are here to help: Phone: 732-765-0900 Email: sales@digivac.com

Section 8: Understanding Torr

The Display Units are calibrated in microns or "millitorr." What are microns and how do they relate to other measures of pressure and vacuum?

Microns are not really a measure of vacuum at all, but rather of absolute pressure. The pressure of the atmosphere is 14.696 or approximately 14.7 pounds per square inch (PSI) at sea level. This pressure is due to the weight of all of the air in the earth's atmosphere above any particular square inch. This 14.696 PSI is equivalent to the pressure produced by a mercury column of approximately 29.92 inches high or .76 meters (about 3/4 of a yard) or 760 millimeters of mercury. Atmospheric pressure varies greatly with altitude. It decreases approximately 1 inch of mercury per thousand feet of altitude. It also varies widely with local weather conditions. (variations of 1/2 inch in a single day are common.) The word vacuum means pressure lower than atmosphere. However, in describing negative pressure, the atmosphere is only a satisfactory reference if we are dealing with values of vacuum down to

about 27 inches of mercury. Below that, it is better to talk in terms of absolute pressure, starting from absolute zero, which is the approach that DigiVac takes with our display instruments.

One TORR is an absolute pressure of one millimeter of mercury. A millitorr is equal to one thousandth of a TORR. A MICRON equals a millitorr. The full scale reading of a DigiVac gauge is 1999 microns and is equivalent to 1.999 TORR or approximately 2/760 of atmospheric pressure. This is less than .1 inches of mercury, and less than .05 PSI.

Section 9: Attachments and Illustrations

Types of Sensors Supported

Description	Manufacturer	Supported Part Numbers	Sensor Interface	Number Supported	Required StrataVac Card	Required Adapter	Driver
KJLC Pirani	Lesker	PIR-xx-x	FCC68	3	AG-CM-STR	none	Pir
KJLC Cold Cathode	Lesker	CCG-xx-x	FCC68	3	AG-CM-STR	none	CC
KJLC Cold Cathode Pirani	Lesker	CCPG-xx-x	FCC68	3	AG-CM-STR	none	CCP
PVG-500 Pirani	Agilent	PVG500xxxxx	FCC68	3	AG-CM-STR	none	PV5
PVG-550 Pirani	Agilent	PVG550xxxxxxxx	FCC68	3	AG-CM-STR	none	P55
IKR251 Cold Cathode	Pfeiffer	PT R25 500	Hirschmann	3	AG-CM-STR	CM-HIR-STR	ihr
FRG-700 Inverted Magnetron Pirani	Agilent	FRG70xxxxx	FCC68	3	AG-CM-STR	none	F70
PCG-750 Pirani Capacitance Diaphragm Gauge	Agilent	PCG75xxxxxxxx	FCC68	3	AG-CM-STR	none	P75
PKR251 Inverted Magnetron Pirani	Pfeiffer	PT R26 000	Hirschmann	3	AG-CM-STR	CM-HIR-STR	P25

MPG400/401 Inverted Magnetron Pirani	Inficon	351-xxx	FCC68	3	AG-CM- STR	none	iP4
PSG5xx ATM to Medium Vacuum Gauge	Inficon	350-xxx	FCC68	3	AG-CM- STR	none	Pir
Gemini MAG500 Cold Cathode	Inficon	3MAX-xxx-x0xQ	FCC68	3	AG-CM- STR	none	CC
Gemini MPG500 Cold Cathode Pirani	Inficon	3MBx-xxx-x0xP	FCC68	3	AG-CM- STR	none	CCP
PCG550 Pirani Capacitance Diaphragm Gauge	Inficon	3PCx-01x-000x	FCC68	3	AG-CM- STR	none	P75
MX4A Convection Gauge	Televac	all	DB15	3	AG-CM- STR	AG- DB15- MX-STR	comin g soon
MX2A Thermocoupl e	Televac	all	DB15	3	AG-CM- STR	AG- DB15- MX-STR	comin g soon
531 or 536 thermocouple vacuum gauge tube	Agilent	SEN-53x-xxxx	US-08	3	531-STR	none	TC
902B Absolue Piezo	MKS	902B-xx08x	FCC68	3	AG-CM- STR	none	comin g soon
Sky Ambient Capacitance Manometer	Inficon	3xx-00x	DB15	3	AG-CM- STR	CM- DB15- STR	CM
Sky 45 Capacitance Manometer	Inficon	3CC1-x5xx30x	DB15	3	AG-CM- STR	CM- DB15- STR	CM
Sky 100 Capacitance Manometer	Inficon	3CD1-x5x-230x	DB15	3	AG-CM- STR	CM- DB15- STR	CM
Sky 200 Capacitance Manometer	Inficon	3CF1-x5x-2300	DB15	2	AG-CM- STR	CM- DB15- STR	CM

Stripe Capacitance Manometer	Inficon	3CC9-x5x-2380	DB15	3	AG-CM-STR	CM-DB15-STR	CM
626 Capacitance Manometer	MKS	626Cxxxxyz	DB15	3	CM-STR-DS	CM-DB15-STR	CM
AA01A Capacitance Manometer	MKS	AA01AxxTxxx3x00xxx	DB15	3	AG-CM-STR	CM-DB15-STR	CM
722B Capacitance Manometer	MKS	722BxxTxx2FA	DB9	3	AG-CM-STR	CM-DB9-STR	CM
730B Capacitance Manometer	Setra	730G-xxxx-A-xx-2C-D9-X	DB9	3	AG-CM-STR	CM-DB9-STR	CM
Porter Capacitance Manometer	Inficon	3CAx-x5x-0000	FCC68	3	AG-CM-STR	none	CM
CDG500	Agilent	CDG500Txxxxxxxx	DB15	3	AG-CM-STR	CM-DB15-STR	CM
*note "x", "y", or "z" in part number means the part number can contain any option in that place							

Types of Active Gauges Supported

StrataVac Name		Electrical Interface	Equation
PiR	PVG500 Pirani Active Gauge	FCC68 (RJ45)	$p = 10^{((V-c)/1.286)}$ c=6.304
CCP	MPG 500 Cold Cathode Pirani Active Gauge	FCC68 (RJ45)	$p = 10^{(1.667 \times V - d)}$ d=11.46
CC	MAG 500 Cold Cathode Active Gauges	FCC68 (RJ45)	$10^{(0.75 \times (V-c))}$ c=12.826

Sensor Options

STRATAVAC TOUCH Sensor ID	Gauge Name	Description
0.1	0.1 Torr ambient capacitance diaphragm gauge	0.1 Torr gas independent gauge for high accuracy measurement

1	1 Torr ambient capacitance diaphragm gauge	1 Torr gas independent gauge for high accuracy measurement
10	10 Torr ambient capacitance diaphragm gauge	10 Torr gas independent gauge for high accuracy measurement
100	100 Torr ambient capacitance diaphragm gauge	100 Torr gas independent gauge for high accuracy measurement
1,000	1,000 Torr ambient capacitance diaphragm gauge	1,000 Torr gas independent gauge for high accuracy measurement
CC	Cold Cathode Gauge	Cold cathode inverted magnetron high vacuum gauge
CCP	Cold Cathode + Pirani Combination Gauge	Combination cold cathode inverted magnetron Pirani gauge
PiR	Pirani Gauge	Advanced digital Pirani gauge with stainless steel sensor cell

Inficon SKY Capacitance Manometers supported

StrataVac Sensor ID	Electrical Interface	Description	Equation
0.1	*DB-15	0.1 Torr gas independent gauge for high accuracy measurement	$P=V/100$
1	*DB-15	1 Torr gas independent gauge for high accuracy measurement	$P=V/10$
20	*DB-15	20 Torr gas independent gauge for high accuracy measurement	$P=2 \times V$
50	*DB-15	50 Torr gas independent gauge for high accuracy measurement	$P=5 \times V$
10	*DB-15	10 Torr gas independent gauge for high accuracy measurement	$P=V$
100	*DB-15	100 Torr gas independent gauge for high accuracy measurement	$P=V \times 10$
1,000	*DB-15	1,000 Torr gas independent gauge for high accuracy measurement	$P=V \times 100$

*Requires ADP-DB15-STRC Adaptor

Other Types of Active Gauges Supported

StrataVac Name		Electrical Interface	Equation
523	***MKS 523C Cold Cathode Gauge	DB-9	$p = 10^{(2 \times V - 8)}$
P25	MPG400/401 Cold Cathode Pirani Gauge	FCC68 (RJ45)	$p = 10^{(1.667 \times V - d)}$ d=11.46

***Support with ADP-DB9-523-STR Adaptor

MKS Capacitance Manometers supported

StrataVac Sensor ID	Electrical Interface	Description	Equation
1	**DB-9	722B 1 Torr gas independent gauge for high accuracy measurement	$P = V/10$
20	**DB-9	722B 20 Torr gas independent gauge for high accuracy measurement	$P = 2 \times V$
50	**DB-9	722B 50 Torr gas independent gauge for high accuracy measurement	$P = 5 \times V$
10	**DB-9	722B 10 Torr gas independent gauge for high accuracy measurement	$P = V$
100	**DB-9	722B 100 Torr gas independent gauge for high accuracy measurement	$P = V \times 10$
1,000	**DB-9	722B 1,000 Torr gas independent gauge for high accuracy measurement	$P = V \times 100$
0.1	*DB-15	A-Baratron AA01 0.1 Torr gas independent gauge for high accuracy measurement	$P = V/100$
1	*DB-15	A-Baratron AA01 1 Torr gas independent gauge for high accuracy measurement	$P = V/10$
20	*DB-15	A-Baratron AA01 20 Torr gas independent gauge for high accuracy measurement	$P = 2 \times V$
50	*DB-15	A-Baratron AA01 Torr gas independent gauge for high accuracy measurement	$P = 5 \times V$

10	*DB-15	A-Baratron AA01 10 Torr gas independent gauge for high accuracy measurement	$P=V$
100	*DB-15	A-Baratron AA01 100 Torr gas independent gauge for high accuracy measurement	$P=V \times 10$
1,000	*DB-15	A-Baratron AA01 1,000 Torr gas independent gauge for high accuracy measurement	$P= V \times 100$

*Requires ADP-DB15-STR Adaptor

**Requires ADP-DB9-STR Adaptor

Specifications

Specifications	
Power:	100-240VAC 50/60 Hz CE Rated
Vacuum Interface:	As ordered
Sensor Cable Length:	Dependent on sensor(s) installed
Range:	Dependent on sensor(s) installed
Units:	Torr, mBar, kPa
Mount:	Bench Top; pole mount
Display:	0.40 inch LED 7" Touch
Dimensions, control box:	1.7"H x 3.52"W x 5.35" Deep
Controls:	7 amp, 250 Volt (when orderd)
Telemetry Options:	USB, Wifi
Flow rate:	25 to 3627 sccm, +/- 15% calibrated in air
Bleed vacuum control:	10 millitorr to 10 Torr
Throttle vacuum range:	0.001 - 760 Torr

Section 10: Terms and Conditions

TERMS OF USE, LIMITED WARRANTY & LIABILITY WAIVER

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