DigiVac
Scientific Measurement & Control

SNAP Vacuum Controller

Operational Manual

YOU MUST READ THIS MANUAL BEFORE USE

Aug 4, 2025

Table of Contents

Section 1: Overview

The SNAP Vacuum Controller is a cutting-edge solution designed to deliver precise vacuum control and regulation in one integrated system –without compromising flow rate. Featuring a patented integrated valve, the SNAP Vacuum Controller gives users complete control over their vacuum systems, ensuring reliable performance and enhanced process efficiency. Whether for industrial, laboratory, or research applications, the SNAP controller streamlines vacuum regulation, providing seamless integration into a variety of workflows.

The SNAP's main features include a 7'' touch display, large numerical readings, graphing capabilities, setpoint and recipe control, plus intuitive push-button features.

"Mission control at your fingertips" – the SNAP (Simple, Nimble, Automatic Process Controller).

Features

- Integrated Patented Dual Proportional Bellows Valve
- **Push Button Process control:** Vent, Close Valve, Full Vac (Open Valve)
- Recipe control with up to **10 programmable recipes** with **24 customizable steps** for each recipe
- Onboard ramp rate and Set point control

Product Details

SIMPLE

- Easy setup and push-button process control: Vent, Close Valve, Full Vac (Open)
- Enables use of reliable and long-lasting rotary vane oil pumps & dry scroll pumps in applications where diaphragm pumps were previously required
- Keeps vacuum pumps near their base pressure resulting in greater longevity

NIMBLE-MAXIMIZE THROUGHPUT & PUMPDOWN SPEED

- Widest flow paths available to ensure maximum flow for faster evaporation
    - Optional SNAP External Vent Valve that can quickly vent chambers to atmosphere or a specified pressure using a high throughput external valve (40mm vs the SNAP's built in 20mm) to quickly vent, the valve is operated by opening when there is a user defined difference between the setpoint and the current pressure. Two variables define operation, VD and VDW accessible only over DVCUP.
- Maximize throughput and pump down speed with a 20 mm vacuum path

AUTOMATIC PROCESS CONTROLLER

- Vent your vacuum chamber or equalize your system with the touch of a button without manually pulling hoses or turning valves
- Treat material in chamber gently by implementing controlled ramp rate controls
- Vacuum Controller with onboard ramp rate recipe control based on time and pressure setpoints. Program up to 24 steps in each recipe, a total of 10 recipes.
- Dashboard push-button control allows you to automatically pump down, vent, or isolate your system at the touch of a button
- Ideal for automating and simplifying vacuum chamber pressure control.
- Automates High Vacuum Systems
    - Adds the ability to integrate a turbo pump at a crossover pressure to completely automate high vacuum pump down and vent cycles.
    - Enhanced recipe control so high vacuum can be included in customer set recipes when used with a high vacuum sensor.
- Expand Control Range with optional External Sensor
    - With installing the external sensor in the area you'd like to measure and control allows the SNAPto control a wider range of vacuum as deep as 10^{-5} Torr

PRECISION CONTROL & INTUITIVE DESIGN

- Easy-to-use, precise automated control with real-time graphing of pressure levels, numerical readings, and one-touch start, stop, and release buttons
- Innovative valve control performs both proportional throttle vacuum and vent control
- The integrated vent design allows you to quickly vent to atmosphere and prevent “bumping” during or after processing
- Better control in the rough vacuum and medium vacuum regimes, with a quicker time to setpoint convergence
- SNAP is easier to tune control response
- 24 steps per recipe ensures valves continue to operate more consistently for very long ramps and long running production applications.
- New routines, SNAP stays up and running for longer periods, diminishing downtime.
- Optional Temperature display feature allows the SNAP to read an output from a 4-20mA 0-200℃ temperature device, with the ability for custom temperature equations as well.

Technical Specifications

Technical Specifications				
Dimensions	**Standard**		**Shipping**	
	9.25 x 7.25 x 5		19 x 13 x 13	
Weight	**Standard**		**Shipping**	
	12lbs		20lbs	
Power	100-240 VAC 50/60 Hz, 1.4 Amps			
Mains Supply Voltage Fluctuation	100-240 VAC +/-10%			
Overvoltage Category	OVC II			
Display	Standard Benchtop model with Oven Bracket option available			
Location Use	Indoor use only			
Application Environments	Clean, dry locations only			
Range of Control	2 Torr to 760 Torr (50mTorr -760 Torr with External Sensor)			
Flow Path	20mm			
Flange Type	KF25			
Vent Orifice	3/8" hose barb			
Maximum Pressure of Inlet (Purge) Gas	1 PSI			
Internal Flow Diameter	(ID) = 0.235"			
Venting flow Rate	849.5 Torr L/ Sec			
Temperature Range	-10 to +40C			
R.H.	30% - 60%			
Conductance	L/s: 36.44	L/m: 2186.4	CFM: 76.8884	
Units of Measurement	Millitorr (microns)	Torr	Mbar	kPa
Maximum Altitude	2000 Meters			
Pollution Degree	2			

Optional Add-on Features				
External Sensor Options	DPCP	DPP	DCP	CDG 10 Torr
External Vent Valve Options	KF 25		KF 40	
KF40 External Vent Valve Flow Path	40mm			
KF25 External Vent Valve Flow Path	20mm			
Wifi	Available (for remote monitoring)			
Temperature Display	Displayed on the SNAP screen via Vacuum Oven Output			
Analog in/out	Available			
RS232	Available			

Vacuum Sensors and Ranges

The SNAP's range is sensor-dependent based on if an external sensor is added; see Section 9: Accuracy Specs for all SNAP-compatible sensors.

Currently Supported Sensors:

- Isolated Piezo sensor (775i)
- DigiVac Quantum Sensors: DPP, DCP, DPCP
- Capacitance Manometers (CDG) 10 Torr

Internal Sensor Specifications

- Isolated Piezo Sensor 775i
  - Measurement Range: 1 Torr to 775 Torr
  - Supply Voltage: 5.0 Volts
  - Output Signal: -0.5 to 4.5 VDC, Ratiometric to Supply

External Sensor Specifications

- Quantum DPP SmartSENS Wide Range Vacuum Sensor
  - Measurement Range: 1.0 x 10 -5 to 1000 Torr
  - Supply Voltage: 12-30 VDC
  - Output Signal: STD OUT
  - Vacuum Interface: KF16
- Quantum DCP DuoSENS Capacitive Piezo Vacuum Sensor

    - Measurement Range: 0.01 to 1000 Torr
    - Supply Voltage: 12-30 VDC
    - Vacuum Interface: KF16
- Quantum DPCP TriSENS Wide Range Vacuum Sensor, Pirani & Capacitive Piezo
    - Measurement Range: 1.0 x 10 -5 to 1000 Torr
    - Supply Voltage: 12-30 VDC
    - Vacuum Interface: KF16
- Agilent CDG500 10 Torr Capacitance Diaphragm Gauge
    - Measurement Range: 1000 Torr to 1 Torr
    - Analog Output: 0-10 VDC
    - Vacuum Interface: KF16

For more information on sensor Specifications and Accuracy see Section 10: External Sensor Accuracy

The vacuum interface is also sensor-dependent when using the External Sensor; NPT, KF16, KF25, Conflat, and VCR options are all available. When using the external sensor option please reach out to our engineers if you require installation help and fitting selection to install the SNAP and Sensor into your system. DigiVac stocks a wide variety of vacuum interface adapters to provide the proper connection for your system, including hose barbs, reducers, clamps, and O-rings. Consult DigiVac for availability.

Units of Measurement

SNAP has the ability to read and control in the following units: Millitorr, Torr, Mbar, kPa

Torr	millitorr	Mbar	kPa
0	0	0	0
10	10000	13.3322	1.332
37.503	37503	50	5.00
100	100000	133.32	13.33
500	500000	666.61	66.67
760	760000	1013	101.3
1000	1000000	1333	133.3

Section 2. Quick Start for SNAP

After the instrument is received, carefully unpack and inspect the instrument for damage during shipment and confirm that all components are present.

Please note the warranty pertains only to the instrument and does not cover damages or loss in shipping.

Packing List

- SNAP Vacuum Controller
  - (2) KF25 vacuum ports for vacuum connection
  - ⅜'' vent port hose barb
  - 7" touch screen with knob control
  - USB output
  - (1) Analog in/ (2) analog out communication
- Power supply
- Quick start guide

Optional Add-on Inclusions

- Digivac Quantum DPP Sensor + Cable
- Digivac Quantum DPCP Sensor + Cable
- DigiVac Quantum 10 Torr Capacitance Manometer + Cable
- Agilent CDG 10 Torr Capacitance Manometer + Cable
- KF25 External Valve
- KF40 External Valve
- RS232 output
- Wifi (Antenna connected to the SNAP)

Setting Up the SNAP

To set up the SNAP Vacuum Controller: The only required components for operation are power to the unit, a vacuum pump, and a vacuum system.

Installation Steps:

1. **Mounting:** Find a suitable location for mounting the SNAP. In landscape mode, SNAP sits on rubber feet. It should be placed where the touchscreen is easily accessible, and process vibration is minimal. A mounting bracket or pole clamp can be added-on to

allow for direct mounting to certain vacuum ovens or rotary evaporators. These options are best used in SNAP's portrait mode.

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2. **Powering Device:** In considering integration into systems, no precautions are required except for the requirements of plugging SNAP into a properly grounded outlet. When placing SNAP, ensure access to power supply/power cord is not restricted. Accessibility to power supply and cord must be maintained. The SNAP is supplied with an appropriately rated power cord. It is inadvisable to substitute this cord for any other during use.

   Plug the included AC cord in the power supply, then plug the power supply into the DC jack on the rear of the SNAP. Connect the SNAP power supply into a grounded outlet (SNAP MUST be plugged into a properly grounded outlet) now the SNAP can be powered on with its switch when ready.

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3. **Connect to Vacuum Pump**: Connect your vacuum pump to the KF25 input labeled "Vacuum Pump".

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4. **Connect to Vacuum System:** Connect your vacuum system to the KF25 vacuum output labeled "System".

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5. **Vent Port (optional):** If you would like to use a gas other than ambient air to vent your system, connect that vent gas to the hose barb. Many customers may choose to vent with dry Nitrogen.

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6. **Data Capture (optional):** Attach the USB cable to a PC or other system for data capture.

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7. **Analog In/Out (optional):** Connect to a PLC and use specified voltages to control.

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8. **External Sensor (optional):** Connect an external sensor (i.e. DPCP 10 Torr Capacitance or DPP Manometer for improved accuracy).

9. **External Valve (optional):** Connect an external valve to allow faster venting than the internal vent valve alone.

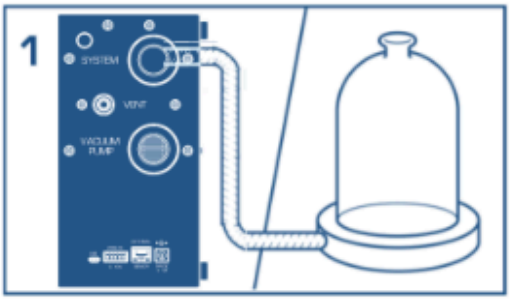
10. **Power:** Plug in the unit and turn it on.

11. **Read Vacuum!**

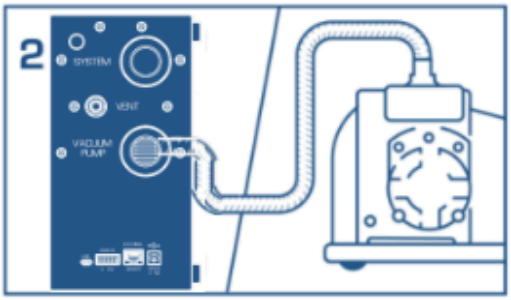
Vacuum Oven Connection Quick Start

Quick Start Guide

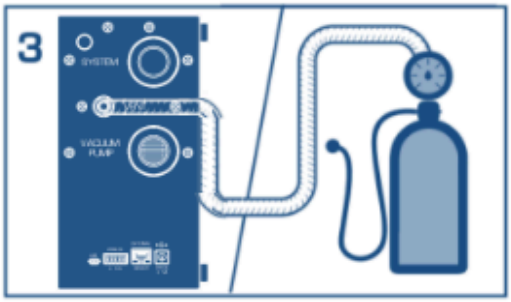
SNAP
Controller| Vacuum oven



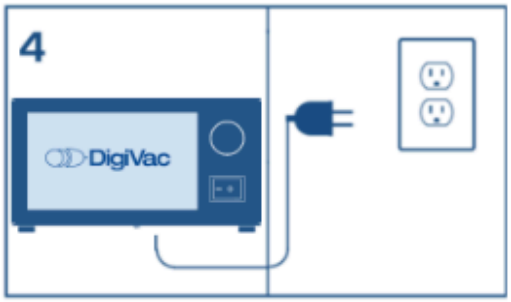
Connect system



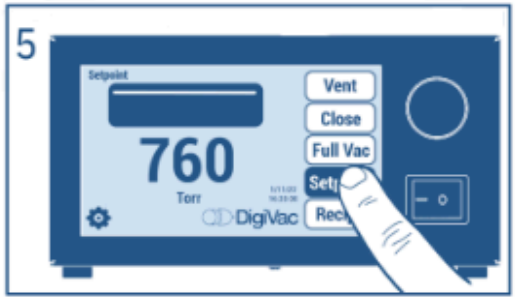
Connect vacuum



(Optional) Connect Vent to nitrogen or other inert gas or leave open to air



Plug in and power on

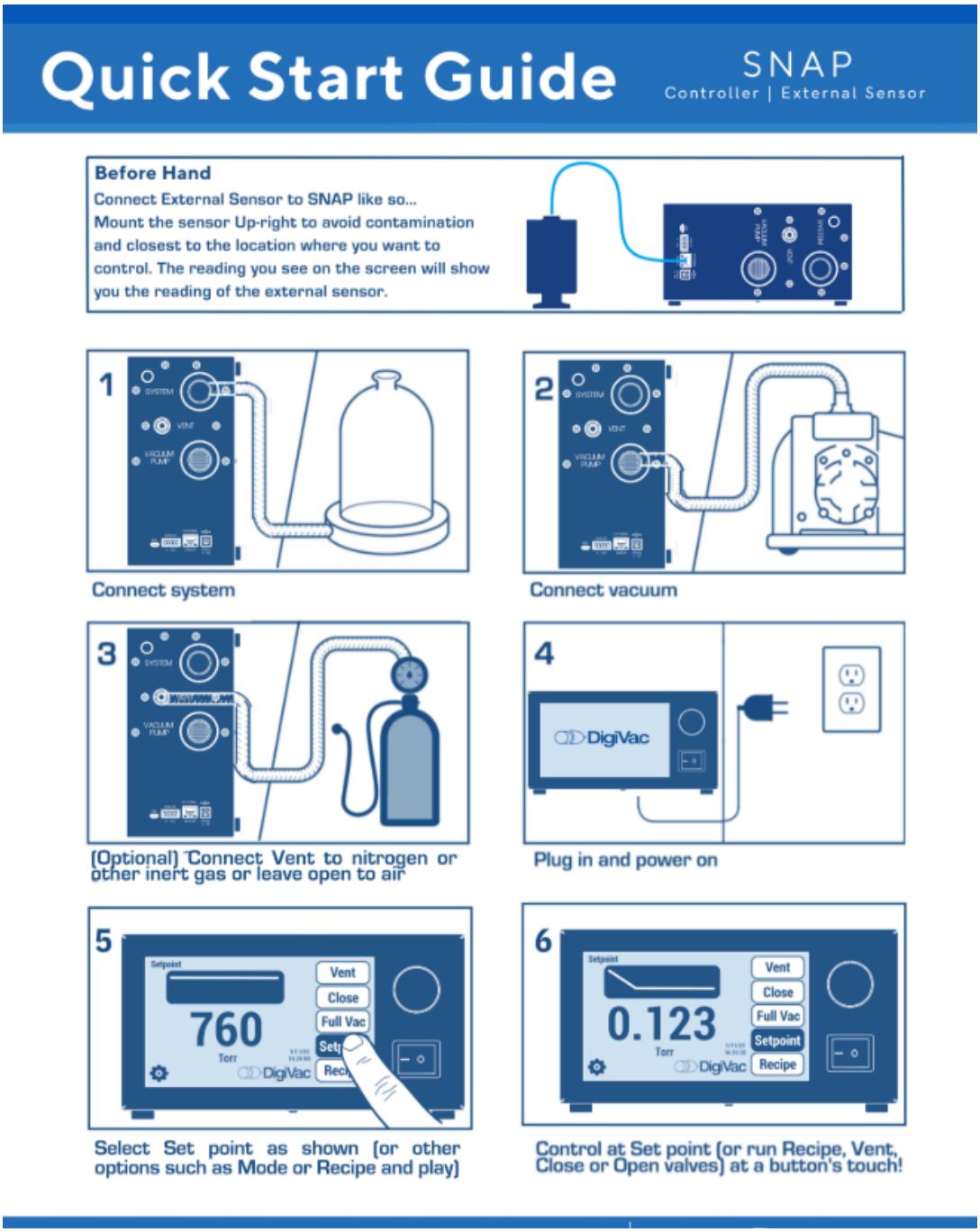


Select Set point as shown (or other options such as Mode or Recipe and play)

Control at Set point (or run Recipe, Vent, Close or Open valves) at a button's touch!

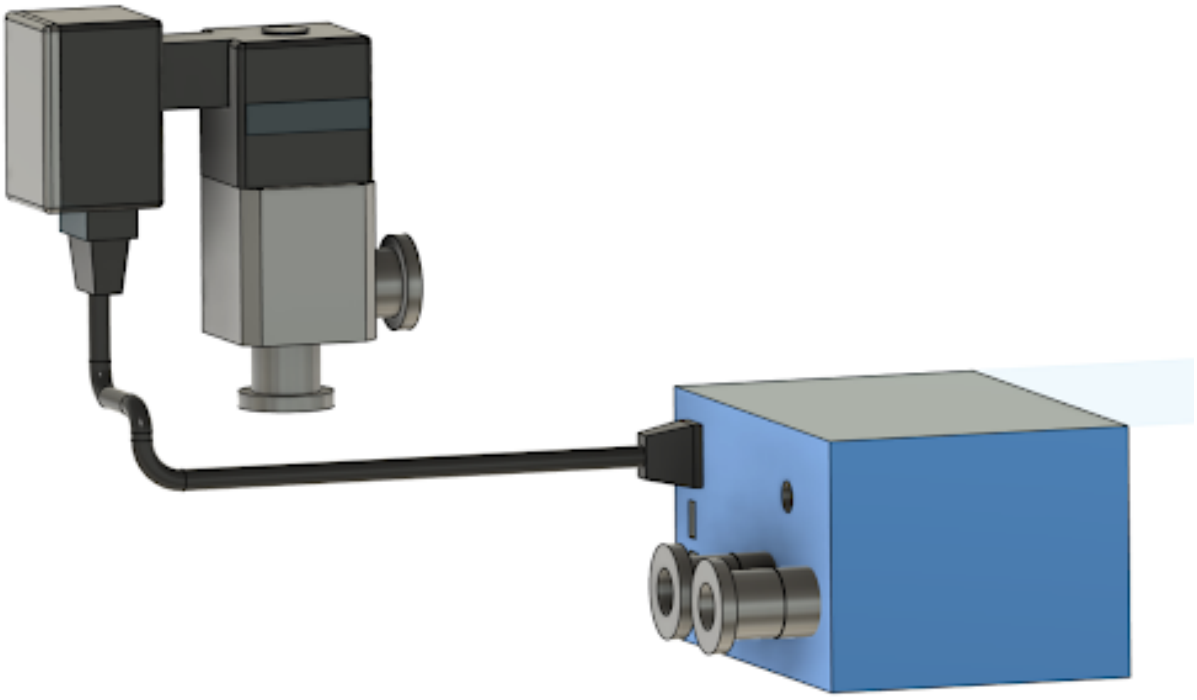
Installation Note for Optional External Sensor:

Mount the sensor as close as possible to the desired control point. The reading you see on the screen will reflect the reading of the external sensor. Operate the unit according to the directions in the next section just as you would with the internal sensor.



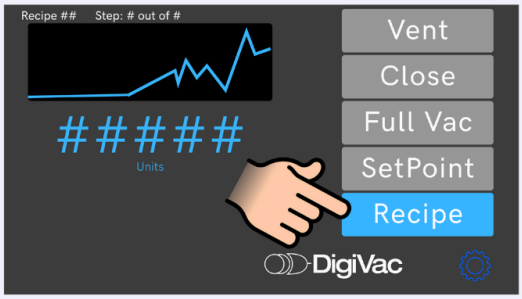
Installation Note for Optional External Valve (in Vent Mode):

Mount the external valve on a suitable location on the chamber, following the orientation specified in the manual for that valve. The valve should connect the chamber to atmosphere, with one side facing the chamber and the other open to ambient air. Operation is detailed in the Faster Venting section.



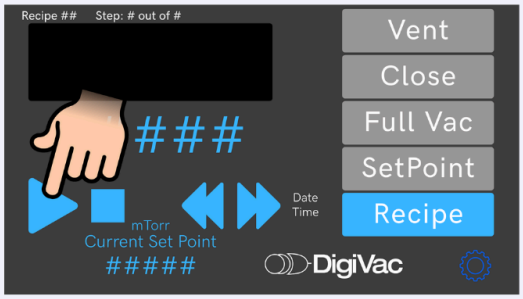
Setting Up SNAP Recipe

1



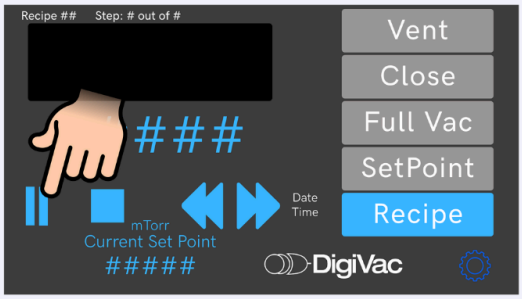
Press Recipe to enable Recipe mode.

2



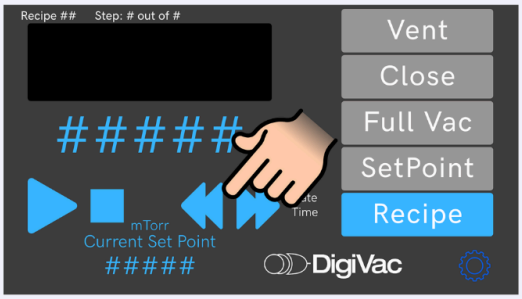
Initiate recipe by tapping the triangular start button

3



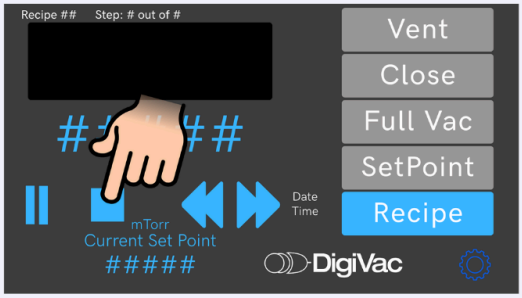
Pause recipe by tapping the two-line pause button

4



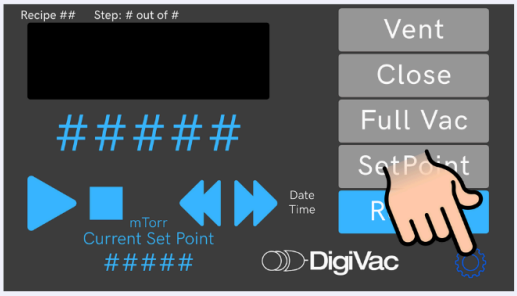
Skip Recipe steps, or go back to a previous step by tapping the skip or reverse recipe buttons.

5



Cancel recipe by tapping the square cancel button

6



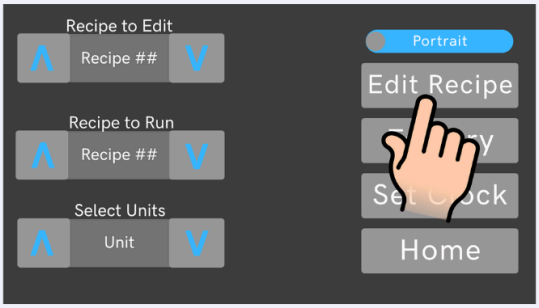
To Edit recipe, tap the settings gear icon in the lower right corner.

Recipe Menu Walkthrough & Set Up | Quick Start

7

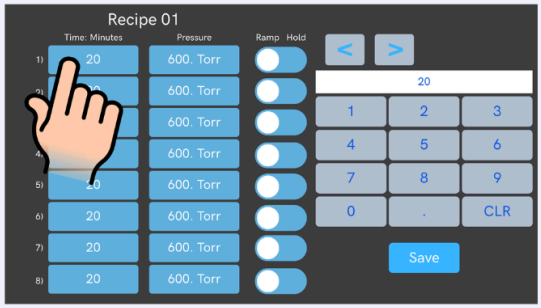
Change the recipe you would like to edit by selecting the recipe that you want to edit by tapping the up and down buttons under "recipe to edit".

8



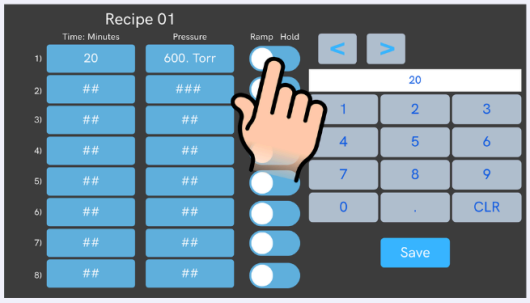
Once you have selected the proper recipe to edit, you can enter the edit recipe menu by tapping the "Edit Recipe" button.

9



In order to edit the selected recipe, enter the value you would like to use in the recipe using the keypad. The box above will show the value that you can apply to any of the fields under time and pressure. Tap the box you would like to change to the entered value to correct the value.

10



Ramp vs Hold: By selecting "Ramp", the device will reach the desired setpoint at the end of the time allotted for the step. For example, if going from 760 Torr to 600 Torr, which is the first step setpoint in this example, the device will take the entire 20 minutes to reach the 600 torr setpoint. If Hold is selected the device will allow the connected pump to reduce the pressure to the setpoint as fast as the system can adjust. It will also vent or backfill to raise pressure, also changing pressure as fast as the system can adjust, and holding it at that setpoint pressure until the time for that step is over.

11

To change the recipe you would like to run , select the recipe using the up and down button under "recipe to run". This is the recipe that will be used when the "Recipe" button on the home screen is tapped.

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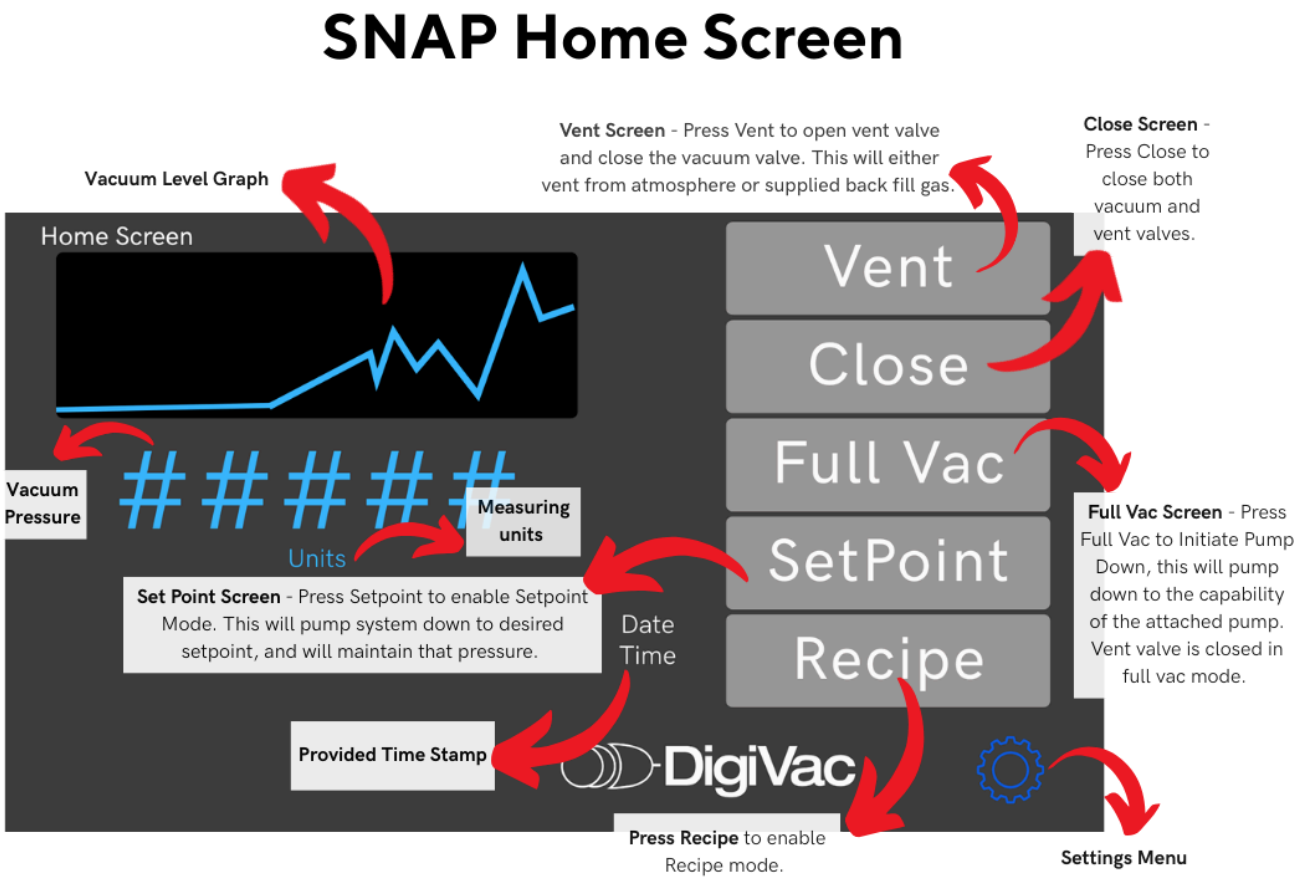
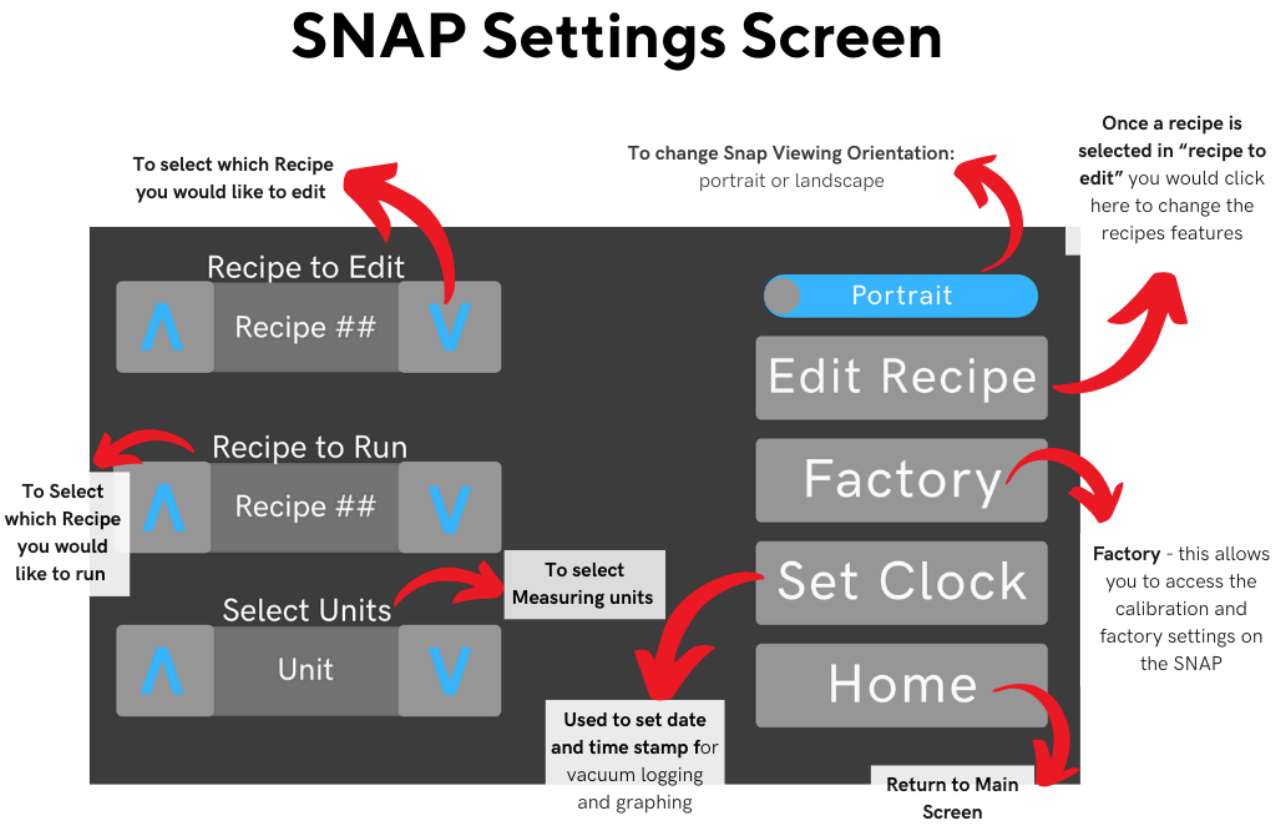
Section 3: Menu Screens

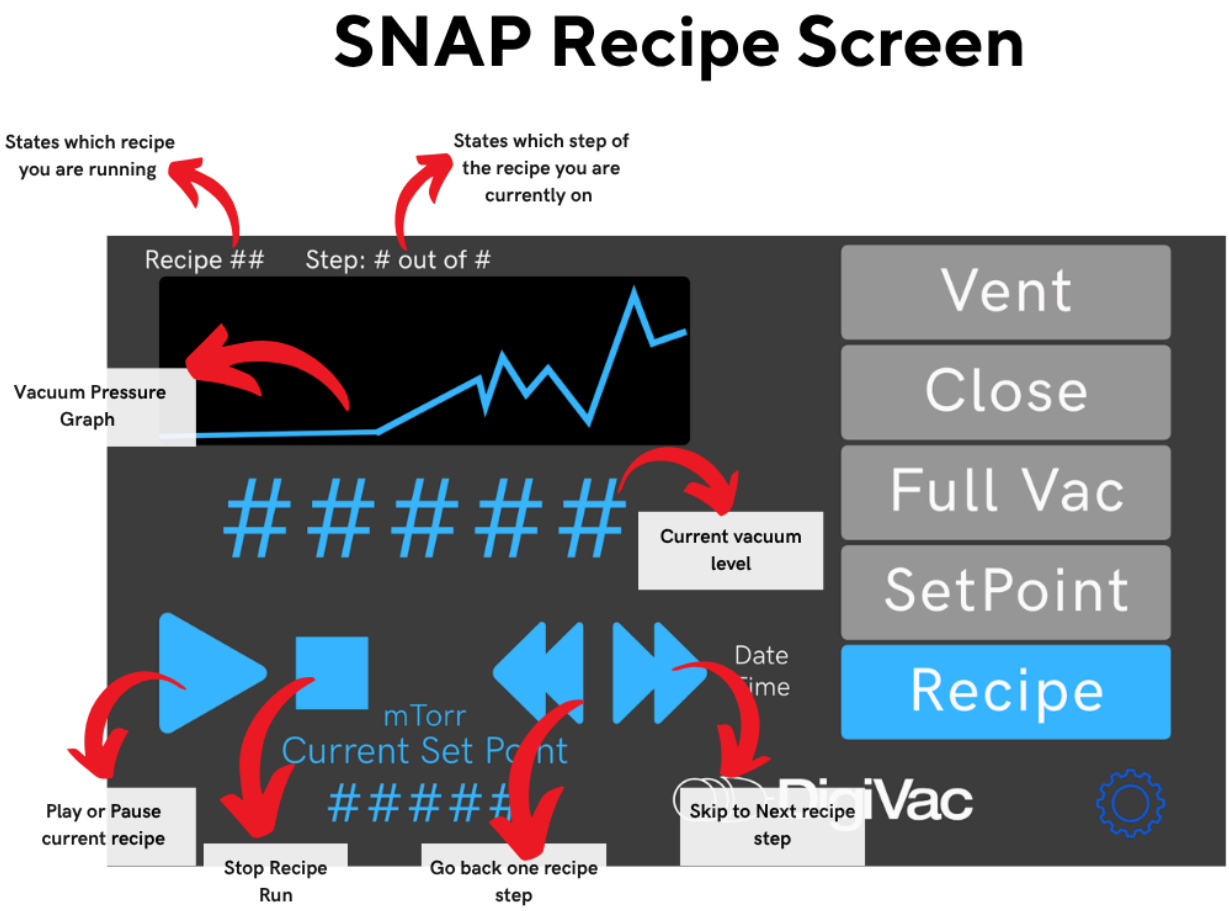
Main Menu Diagram



Setting Menu Diagram



Recipe Menu Diagram



Section 4. Operation

After installation, the unit is ready for immediate operation. This section explains how to control SNAP's channels using the display interface.

SNAP is equipped with a variety of control options:

▶️Watch a video of the overview here and feature-set here

Control Set Options:

1. **Recipe Control**
2. **Setpoint Control**
3. **Vent to ATM (Bleed Control) or ability to vent with an inert gas**
4. **Close all valves and isolate the system**
5. **Full Vacuum**

RECIPE CONTROL

This mode is a powerful feature that allows users to set recipes based on their desired process parameters. The SNAP allows for 10 recipes to be saved and customized at any time.

Set up to 24 steps per recipe with options to **ramp** or **hold** a specific vacuum level. It can also perform each step at a desired pressure for a set time in **minutes** or **seconds**. Learn more about creating a custom recipe in the Creating Custom Recipes section.

Recipe Control also features easy recipe manipulation allowing a user to Play, Pause, Stop, Rewind, and Skip steps while a recipe is live. Learn more about Recipe features in the Using Recipe Mode section.

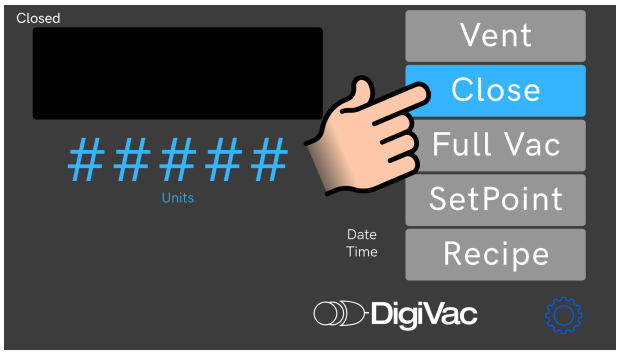
▶️Watch this video on how to set up recipes easily here

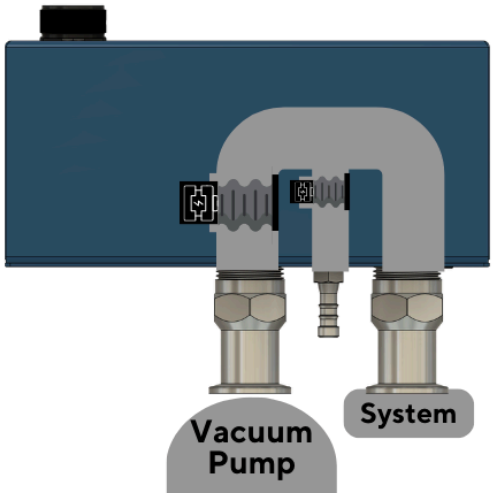
SET POINT CONTROL

This mode uses both vacuum pump suction and ambient air/supplied gas pressure to control the system's vacuum level at a user-defined setpoint. Learn more about setting a custom set point in the Controlling at a Setpoint section.

CLOSE (Isolate)

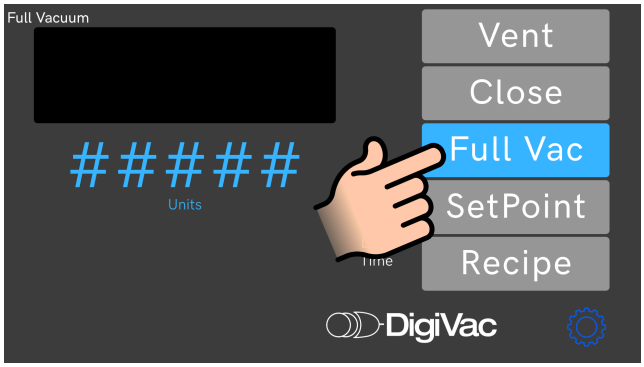
This mode isolates the system by closing both the vacuum and the vent ports. The system is sealed off from both Atmosphere (ATM) and the vacuum pump when this mode is activated.

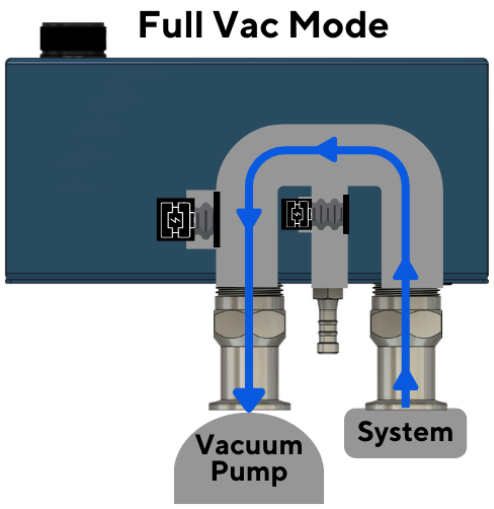




FULL VAC

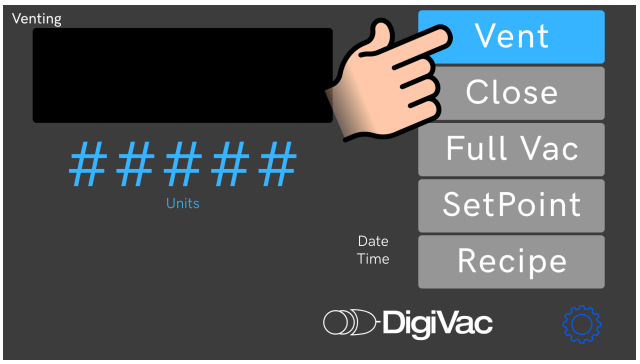
This mode closes the vent port and opens the vacuum port, allowing rapid and complete pumpdown of the system.

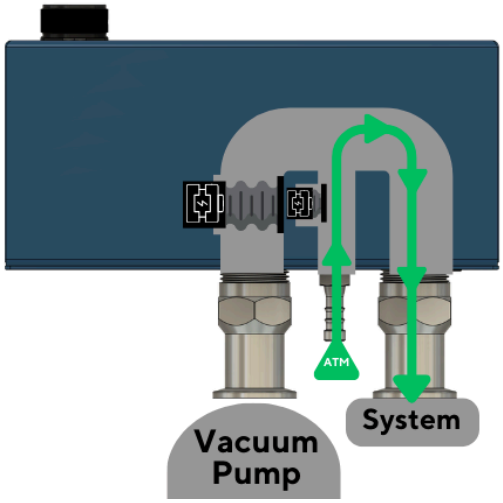




VENT

This mode closes the vacuum port and opens the vent port to quickly ventilate the system to atmosphere—ideal for preventing bumping in rotary evaporators or ending a process.





Controlling at a Setpoint

1. **Note:** You can either control in setpoint mode, Recipe mode (page 11) or with Analog input. The button highlighted in blue is the currently selected mode.
2. Once setpoint mode is activated, the setpoint value button located below the vacuum reading will appear. It will read “S-###.##”, listing the current setpoint.
3. To adjust this setpoint, press the setpoint value button, turn the knob to the desired setpoint, then push the knob in to save the new set-point, or press the SAVE button on the screen. When you return back to the home screen you will see the value on the setpoint value button change.
4. You are now ready to begin controlling vacuum

PLC Interface for SNAP Analog Input Control

The SNAP controller's analog input (IN 1) accepts 0-10VDC signals to set vacuum pressure setpoints. Configure your PLC's analog output module for 0-10V operation and connect to the SNAP's IN 1 terminal.

Voltage Control Logic

- **< 0.5V**: Vacuum path fully open, vent closed

- **0.5V - 9.5V**: Proportional pressure control (see conversion formulas below)
- **> 9.5V**: Vent path fully open, vacuum closed

Setpoint Conversion Formulas

Select the appropriate formula based on your sensor configuration:

- **775i Sensor Mode**: `Voltage = (Pressure + 42) ÷ 86`
- **DCP Sensor Mode**: `Voltage = (Pressure + 55.5) ÷ 111`
- **10 Torr Sensor Mode**: `Voltage = (Pressure + 0.503) ÷ 1.11`

PLC Programming Example

For a 1.0 Torr setpoint using 775i mode:

```
Setpoint_Voltage = (1.0 + 42) ÷ 86 = 0.5V

Analog_Output_Raw = (0.5 ÷ 10) × 32767 = 1638 counts (for 16-bit DAC)
```

Wiring Notes

- Use shielded cable for analog signals
- Connect shield to PLC analog common
- Verify PLC output range matches 0-10VDC requirement
- Test with multimeter before connecting to SNAP controller

Setting PID Variables to Optimize Performance

SNAP ships with PID variables that are optimized for average vacuum hose lengths for 20 and 50 liter vessels. The SNAP is capable of controlling much smaller and larger vessels, but may require some PID tuning to optimize the control. There is a PID help screen on the unit as well that explains basic PID tuning.

For more background on PID learn more here.

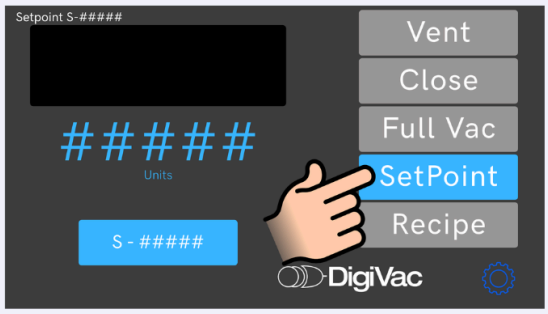
You can access PID variables from the Setpoint (S - xxx) button when in Setpoint mode.

To adjust:

- Click on S - xxx button
- Click on PID
- To put in a different number, input that number in the dialogue box
- Touch the value box of the variable you want to change (P, I, D)
- Click OK
- Your new PID variable is set.

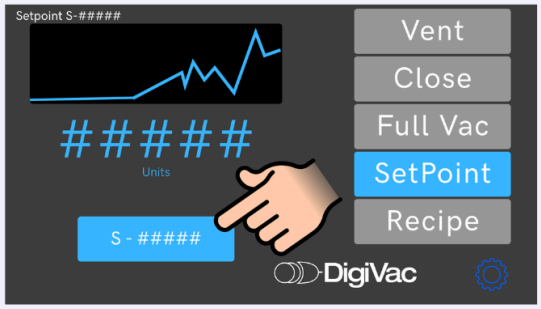
SNAP Set Point & PID Quick Start

1



Set Point Screen - Press Setpoint to enable Setpoint Mode. This will pump system down to desired setpoint, and will maintain that pressure.

2

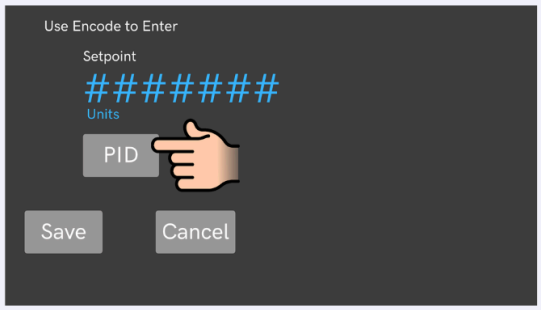


Press SetPoint Value to Adjust SetPoint

3

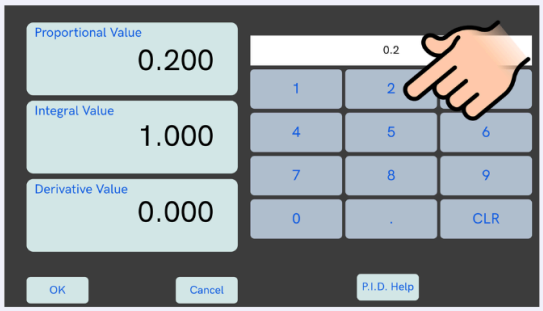
SetPoint Adjustment Screen - Rotate Encoder Knob on Snap to adjust SetPoint for SetPoint mode. Press Save to save new SetPoint Value.

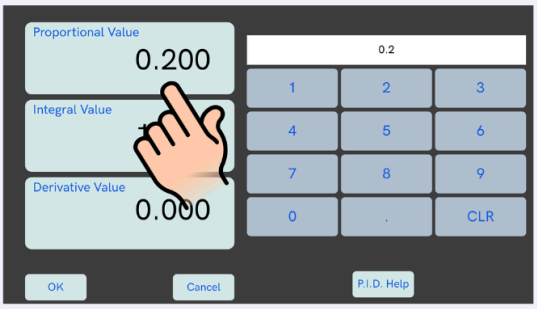
4



Press PID to adjust PID values.

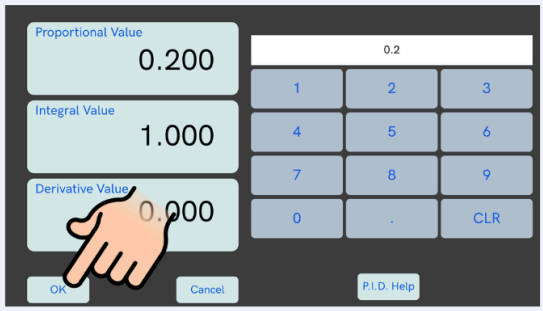
5





Using the Keypad, enter the value you want to set any of the PID numbers at, the box above the keypad will display the value you can set. Set this value to P,I, or D by tapping the box of the value you wish to change. The value will change to whatever is entered in the box above the keypad.

6



Press Ok, to save entered PID values and exit PID menu.

***Note:** In general, if you seem to be hunting around the setpoint, but never hitting it, reduce P. If you can't seem to ever get to your set point, increase P. There are dissertations in the art of tuning PID, so feel free to leverage them, or call us to help.*

Using Recipe Mode

To control in Recipe mode, press the Recipe button.

Recipe Quick Key:

- **Play** shall run/resume the selected recipe
- **Pause** shall pause the selected recipe and maintain the current pressure level. When play is then pressed, the selected recipe will pick up from it left off and resume
- **Stop** shall end the selected recipe, reset the clock, and maintain the current pressure level. When play is then pressed, the selected recipe will start at step 1

- **Rewind** goes back one step in the current recipe. If you are on step 3, pressing this button will bring you to step 2 and reset the time in that step to 0.
- **Skip Forward** will advance the recipe by one step.
- If during a process, set point, recipe, vent, close, or full vac is pressed, the current recipe will be **paused**. Recipes operate in a radio button configuration – **when a mode is selected, all others modes are not active**

Play, Pause, Stop, Rewind, and Skip Forward are only associated with recipes (i.e. only work in recipe mode)

Creating Custom Recipes

Here is a step by step guide on how to create up to 10 recipes:

1. From the home screen, press the **GEAR ICON**
2. Select the recipe number to edit, then press **EDIT RECIPE.**
3. Customize the selected recipe by **TIME** (base of **seconds** or **minutes**) and **PRESSURE** (in Torr) and whether you want to **RAMP** or **HOLD**

Time/Pressure: to input the the time and pressure, use the number pad to enter the desired points then press the step row or column you want the digit to reside in

RAMP: pressure will ascend for a duration of time expressed. Ex. You want to go from 60 Torr to 40 Torr in 2 minutes. SNAP will moderate pressure down to the new set-point so the pressure change is spread out linearly over the 2 minutes. The setpoint ramp is a $y=mx+b$ function where $m = dP/dT$.

HOLD: Pressure change will go quickly to the next pressure point and hold for the specified time. When the recipe ends, it maintains the final setpoint of the recipe.

Watch a video on setting up a recipe here

USB Operation

The SNAP can be easily remote controlled via USB by simply connecting a cable to the Micro-USB interface.

USB has configurable baud rates of 9600, 19200, 115200

When connecting SNAP to a windows PC, the drivers will automatically install and then a terminal session may be initiated. Below is a summary of the commands.

***Note:** recipes can currently only be input and activated from the touch screen, but set points may be activated by command line if you are in set-point mode only (not available in Recipe mode).*

Time-Based Vacuum Differential Control With External Valve (Optional Add-On)

Faster Venting Operation

The Time-Based Vacuum Differential Control is an advanced feature of the SNAP vacuum controller, designed to optimize vacuum regulation by dynamically adjusting an external valve. It operates based on vacuum differentials (VD) over predefined time intervals (VDW), ensuring the system reaches the target vacuum level efficiently within the specified timeframe.

Users can configure the Time-Based Vacuum Differential Control feature through **DVCUP**. Setup involves specifying two key parameters:

- **Time Interval (VDW):** The maximum amount of time (in seconds) allowed for the vacuum to reach the setpoint.
- **Vacuum Differential Threshold (VD):** The allowable deviation (in Torr) from the target setpoint within the defined time interval.

If the vacuum does not come within **VD Torr** of the desired setpoint within **VDW seconds**, the controller will activate the external valve, allowing the system to vent more quickly and move toward the next setpoint.

Example Configuration

- **VD:** 10 Torr
- **VDW:** 10 seconds

In this case, if the vacuum level is not within 10 Torr of the setpoint within 10 seconds, the external valve will open to accelerate venting.

DVCUP Command Reference

Use the following commands in **DVCUP** to query or set the VD and VDW parameters.

Query Current Values

VD?

```
VDW?
```

Set New Values

```
VD=(x)      // Set the vacuum differential threshold in Torr

VDW=(x)     // Set the time interval in seconds
```

Faster Pumpdown Operation

The Time-Based Vacuum Differential Control is a sophisticated functionality integrated into the SNAP vacuum controller, designed to optimize pumpdown performance by dynamically regulating an external valve based on vacuum differentials (VD) within predefined time intervals (VDW). This feature enhances efficiency by ensuring that the system reaches deeper vacuum setpoints in a timely manner.

When enabled, the Time-Based Vacuum Differential Control continuously monitors the system pressure against the user-defined setpoint. If the pressure has not reached the pressure differential (Current SP + VD) within the user-set time (VDW), the controller opens the external valve to increase pumping orifice. Valve modulation is performed with precision to accelerate pumpdown without overshooting or instability.

Users can access Time-Based Vacuum Differential Control settings through DVCUP. Configuration involves setting two primary parameters:

- **Time Interval (VDW):** Defines the maximum time allowed for pressure to fall toward the setpoint.
- **Vacuum Differential Threshold (VD):** Specifies how much pressure should drop (in Torr) within that time.

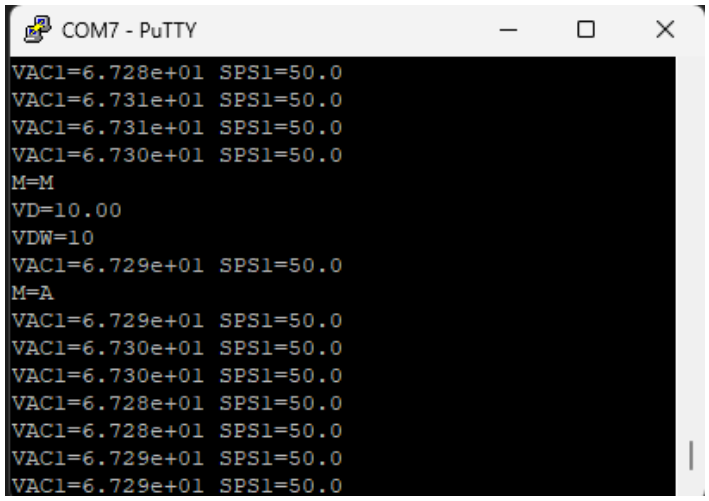
If the pressure has not dropped to **VD + SP** value when the **VDW time** elapses, the controller triggers the external valve to open, allowing faster evacuation toward the desired vacuum.

Example Configuration

- **Starting Pressure:** 760 Torr
- **Setpoint (SP):** 50 Torr
- **VD:** 10 Torr
- **VDW:** 10 seconds

If the system does not reach 60 Torr or lower (within 10 Torr of the 50 Torr setpoint) within 10 seconds, the controller will open the external valve to accelerate pumpdown. This ensures the system continues progressing toward the vacuum target efficiently without unnecessary delay.

DVCUP Command Reference



RS232 Operation (Optional Add-On)

The SNAP can be easily remote controlled via RS232.

SNAP features USB connectivity as standard equipment and can be outfitted with an optional RS-232 (serial) module, allowing data monitoring/collection as well as full process control of all SNAP user functions.

The RS-232 port is bi-directional with user-settable baud rates of 9600, 19200 or 115200, with 8 data bits, no parity and one stop bit (independent UART channels are used for USB and RS-232).

The user connection is a 9-pin d-sub female connector installed on the rear panel. Free communications programs such as PuTTy or Docklight combined with our robust DVCUP command set can be used to log SNAP serial data or add automation to your vacuum process.

***Note:** that while USB is standard on SNAP, only one optional communication module can be installed; either WiFi or Serial RS-232.*

Wifi Operation (Optional Add-On)

This section describes how to connect your DigiVac gauge to a WiFi network, enabling remote monitoring capabilities.

Setting Up WiFi on Your Gauge

1. **Power On the Gauge**
   Ensure the gauge is powered up and operating normally.

2. **Locate Network Credentials**
   On the bottom of the gauge, locate the label showing the WiFi SSID and password.

3. **Connect to the Gauge's WiFi Network**
   Using a phone, tablet, or computer, go to your available WiFi networks and connect to the one that matches the SSID on the label. Enter the password as prompted.

4. **Access the Configuration Portal**
   Open a web browser and navigate to:
   `https://192.168.4.1`
   You should see a DigiVac welcome screen with a three-line menu icon in the top left corner.

5. **Assign Customer and Gauge IDs**

   - Click the menu icon and go to **Gauge > Customer**.
   - Assign a **Customer ID** and a **Gauge ID** for each sensor connected to the gauge.
   - These IDs can be any values you choose but must be unique. They will be used later for remote access and logging.

6. **Connect the Gauge to Your Workplace WiFi**

   - From the main menu, navigate to **WiFi**.
   - Enter the SSID (network name) and password for your workplace or facility's WiFi network.
   - This allows the gauge to communicate with the internet for remote access.

7. **Check the IP Address**

   - After submitting your network info, return to the menu and select **IP Address**.
   - The static IP address assigned to your gauge will appear here.

- If it does not display right away, try power-cycling the gauge or refreshing the configuration window.

Note: You can re-enter the configuration portal at any time by reconnecting to the SSID printed on the gauge and navigating to `https://192.168.4.1`.

DVCUP Cheat Sheet

SNAP DVCUP Cheat Sheet V1.7.C

Sensor and Valve Controls:

Sensors:

With Only Internal Sensor:
VAC1? ..... Get vacuum reading of sensor 1 (internal sensor)
With Optional External Sensor:
VAC1? ..... Get vacuum reading of external sensor
VAC2? ..... Get vacuum reading of internal sensor

Control Valves:

REINIT! ..... Reinitialize valves.
SPS1=1 ..... Set the setpoint to 1.

PID Tuner For Valve:
P1=0.8 ..... Set the Proportional variable
I1=1 ..... Set the Integral variable
D1=3 ..... Set the Derivative variable

Commands to Control Internal Valves:
Status? ..... Get current valve mode for internal valve.*
*** Response is "Setpoint","Vent","Full Vac", or "Close"**

SP! ..... Set Valve to Setpoint mode
Vent! ..... Set Valve to Vent mode
Full! ..... Set Valve to Full Vac mode
Close! ..... Set Valve to Closed mode

External Valve
VE1=0/1 ..... Enable/Disable External Valve 1
VF1=P/V ..... Set External Valve 1 to Pumpdown (P) or Vent (V)
VD1=5 ..... Set the vacuum differential to 5 units
VDW1=10 ..... Set the vacuum differential time to 10 seconds

Units and Data Mode:

Units:

U? ..... Get the current units.*
***Response is "U=0", "U=1", "U=2",or "U=3" | 0=Torr, 1=mBar, 2=kPa, 3=mTorr**
U = 0 ..... Set the units as Torr
U = 1 ..... Set the units as mBar
U = 2 ..... Set the units as kPa
U = 3 ..... Set the units as mTorr

Mode:

Query Current 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.

Set Current Mode:
M = A ..... Data will be sent automatically at the specified T
M = M ..... Data will only be sent when queried
M = H ..... Auto string will change to [vacuum value] [setpoint]
M = S ..... Standard auto string "Vac1=..."

V? ..... The device will respond with the version info

For user applications, it is often recommended to set the mode to manual (M) and query the data as necessary.

Timing:

T? ..... Get the current data rate for DVCUP
T = 1 ..... Data will be sent 1 time per second, minimum: 0.01

Section 5: Troubleshooting

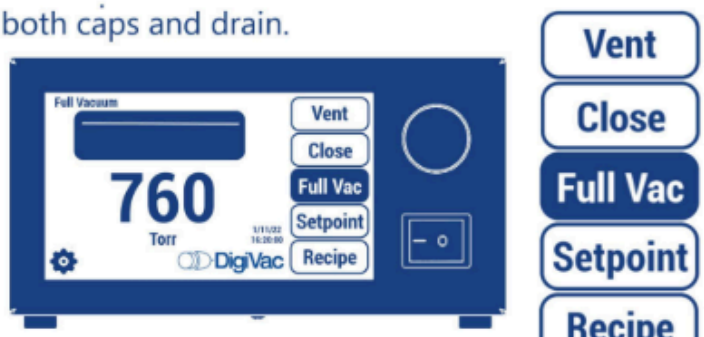
Observations

Observation	Possible Causes
System does not turn on	Verify the system is plugged in, and all the cords are tight
System takes too long between set points	Take the SNAP out of the system, , then record how long it takes for the system without the Snap to get from the first vacuum level to the second vacuum level. ● Re-install the SNAP and run same test ● If the 2 tests are close, that means the SNAP is performing as it should. If the last 2 tests are different, it means the SNAP is not performing optimally. **Please consult your vendor for technical assistance.**
Readings are erratic	Check reading with another gauge to see if the readings are indeed erratic. If the other gauge does not show erratic readings, consult your vendor.
SNAP is noisy	The valves might make a whiny or buzzing sound at startup. This is normal.
SNAPbehaves erratically with over and undershooting, and can't seem to hit a setpoint.	Adjust PID variables, probably reduce variable "P"
Snap seems to be "breathing"	The base pressure of the pump is probably high as well. This can be solved by resetting the PID. If SNAP is controlling too aggressively, try setting P=p/2. Want to learn more see our white paper on PID

Cleaning Procedure

SNAP CONTROLLER CLEANING PROCEDURE

1. With the device disconnected from your vacuum system, **POWER ON** the **SNAP CONTROLLER**.
2. Press **FULL VAC** to fully open the vacuum valve. **POWER OFF** the device.
3. On the rear of the **SNAP CONTROLLER**, cap off the **VACUUM PUMP** port. Fill the device with ethanol through the **SYSTEM** port.
4. Once filled, cap off the **SYSTEM PORT**. Shake the device vigorously to fully coat the interior. Soak for a minimum of 30 minutes, shaking every so often.
5. Remove both caps and drain.



DigiVac

Section 6: Servicing and Maintenance

Manufacturer Service Requirements

These parts must ONLY be serviced by DigiVac:

- Power Supply
- Sensor
- Internal Printed Circuits Boards and Wiring

Using other part will void UL certification

Sensor and Plumbing

In many cases, a sensor may become fouled with oil or other foreign matter. It is often possible to restore the functionality of contaminated probes with cleaning. If the contaminant is known, the SNAP plumbing should be filled with a fluid that is known to be a solvent to that contaminant. Ethanol and alcohol are powerful solvents effective against many contaminants.

After cleaning with solvents, the plumbing should be completely dried or flushed with a volatile solvent to assure that it is dry prior to reinstalling it. If this is not done, contamination of the system may result.

Maintenance

Your vacuum instrument should give you many years of trouble-free service. There are no regularly scheduled maintenance intervals. If consistent accuracy is required, it is recommended that the SNAP and power supply be returned for an annual calibration check.

Calibration

Note: The SNAP is tested and configured at the factory to work with the vacuum sensor it is purchased with.

DigiVac recommends annual calibration for the SNAP's Internal and any additional External Sensors purchased with it.

Internal sensor

There is inherent drift in all sensors. Repeatability is specified in the datasheet, but the specification is typically a worst case scenario as drift is not easily predicted and depends on the

operating environment. Depending on your accuracy requirements, it makes sense to set up a calibration interval to obtain as found data, and get a fresh calibration. Having this information will allow you to determine the optimal calibration interval. The accepted interval is 1 year, but depends on the accuracy you require and what you have defined in your standard operating procedures (SOPs).

Note the sensors have excellent accuracy by themselves. All gauges are tested under real vacuum in our factory using certified reference standards. DigiVac offers standard calibration and repair services as well as NIST-certified calibration, where we record the SNAP's readings at specific test points compared to a certified reference standard and issue paperwork with the results.

External Sensor

The calibration for the external sensor is performed in the factory with a certified voltage reference. User adjustments to the calibration menu are not necessary and may result in gauge malfunctioning.

To learn *more information* on Calibrating your SNAP please reach out to our technicians at tech_support@digivac.com or Call 732-765-0900, they will be able to provide assistance.

Section 7: Data Monitoring and Logging

USB Serial Monitoring and Data Logging

This section describes how to monitor and log data from the SNAP using PuTTY or any serial terminal software that supports session logging.

Requirements

- Windows PC (or compatible OS)
- USB or Serial connection to the SNAP
- PuTTY installed (Download here)
- Appropriate serial driver installed

---

1. Determine the COM Port

1. Plug in your SNAP via USB.
2. Open **Device Manager**.
3. Expand **Ports (COM & LPT)** to find your SNAP and note the assigned **COM port** (e.g., COM3).

---

2. Open PuTTY and Configure the Serial Connection

1. Launch **PuTTY**.
2. In the **Session** category:
    - Select **Serial** as the connection type.

- Enter your COM port (e.g., `COM3`).
- Set **Speed (baud)** to 115200.

*Note: The baud rate can be changed in the settings. Default is 115200, if you change the baud rate, put the desired baud in the **Speed** section.*

---

3. Set Up Logging (Optional)

1. In the left panel, go to **Session > Logging**.
2. Select **"All session output"**.
3. Choose a location and filename for the log file.
4. Optional: Enable **"Always overwrite it"** or **"Append to the existing file"**, depending on your preference.

---

4. Start the Session

1. Return to the **Session** screen.
2. Click **Open**.
3. A terminal window will open. You should see SNAP output start to appear.

Note: If nothing appears, verify the COM port, baud rate, and cabling. Ensure no other software is accessing the same COM port.

---

5. Stop Logging and Save Your Data

- To stop logging, simply close the PuTTY session window.
- Your log file will be saved in the directory you specified.

Alternative Software Options

If you prefer alternatives to PuTTY, the following also support serial logging:

- **Tera Term**
- **RealTerm**
- **CoolTerm (Mac-friendly)**
- **Minicom** (Linux)

Setup steps are generally similar: configure port settings, start a session, enable logging, and save the output.

Logging Vacuum Data with the RSLogger

Requirements

- SNAP vacuum controller with RS232
- RSLogger
- Micro USB-B cable and USB charging block to power the RSLogger
- DB9 serial cable (male to female) to connect SNAP to the RSLogger
- USB flash drive (FAT32 formatted) for data extraction and storage

---

To Record Data:

1. Power up the SNAP using the provided 24V power supply.
2. Ensure the RSLogger is powered via micro USB-B and a USB charging block. The green LED on the logger should be solid when powered.
3. Connect the SNAP to the RSLogger using the female DB9 to male DB9 cable.

The green LED on the logger will blink once per minute, indicating that a vacuum and temperature data point has been recorded.

Extracting Data from the Logger

1. Unplug the RS232 cable from the logger while leaving it powered on.
2. Insert the flash drive into the logger's USB port.
3. The red LED will blink repeatedly while data is being written to the flash drive.
    - This may take several minutes if the SNAP has been logging for days or weeks.
    - The logger will write all new data recorded since the last data dump.
    - If logging multiple times in one day, new entries will be appended to that day's file.
    - A new file is automatically started at midnight.

Viewing the Data

1. Once the red LED stops blinking, remove the flash drive from the logger and plug it into your computer.

2. Open the folder on the flash drive. It will begin with an underscore and "L" (e.g., `_L120004`).
3. Inside the folder, you will find:
    - Date-coded `.txt` files containing the logged data.
    - These files can also be opened in Excel and saved as `.xlsx` if needed.
4. Important: Do not delete, move, or edit the following system files:
    - CONFIG.BAK
    - MEMORY.MAP

Data Format Example

css

CopyEdit

TIME PRESSURE SETPOINT

2025-01-29 13:13:52.572540 729.0 700.0

Setting Up a New Flash Drive

1. Connect the USB Device

- Insert a FAT32-formatted USB flash drive into the RSLogger’s USB port.
- The logger will automatically recognize and configure the drive.

- Password protection is disabled by default. (Refer to the RSLogger User Manual to enable security options.)

2. Folder Creation

- The RSLogger will create a folder named using the logger's unique serial number, for example: `_L120004`
  - The `_L` prefix is standard across all RSLogger devices.
  - The 6-digit serial number is in HEX format.
- This folder becomes the RSLogger's main working directory, containing:
  - All logged data
  - Logger configuration files
  - System metadata

---

3. First-Time File Generation

- With the logger powered on, insert the flash drive.
- The red LED will blink briefly, then stop.
- The logger will create the following files:
  - `CONFIG.BAK` — Contains configuration settings (timestamp format, baud rate, etc.)
  - `MEMORY.MAP` — Manages internal memory indexing and history

These files are pre-configured by DigiVac on included drives.

Do not delete or modify them outside of official instructions.

For assistance, contact DigiVac technical support.

***Note** on Using a Blank Flash Drive

If a blank drive (one with no CONFIG or MEMORY files) is inserted into a logger that has been actively logging:

- The logger will write all historical data stored in memory to the drive.
- This may take several minutes to hours depending on how long the device has been in operation.
- Once the files are generated and written, the drive can be used normally for future data dumps.

Using a flash drive that already contains the `CONFIG.BAK` and `MEMORY.MAP` files will allow the logger to only write new data since the last dump.

Logging Data Using StrataCapture

This section explains how to log vacuum data from compatible DigiVac controllers (e.g., SNAP, StrataVac, StrataVac Touch, Fyra) using StrataCapture, DigiVac's free data logging software.

Requirements

- Windows PC
- Compatible DigiVac controller (SNAP, StrataVac, etc.)
- USB or Serial connection to the controller

- StrataCapture software installed

---

1. Connect Your Device

- Plug your SNAP into your PC using a USB cable.

---

2. Launch StrataCapture

- Open the StrataCapture application.
- Upon launch, it should automatically detect and display the SNAP.

---

3. Configure Logging Options

- Press File > Select Directory, to select location for saved data.
- The real-time pressure readings will begin streaming into the application.

---

4. Start Logging Data

- Click **RECORD**.
- StrataCapture logs data in `.csv` format with timestamps, making it easy to analyze or import into spreadsheet applications.

---

5. Stop Logging and Review Data

- Click **Stop** to end the logging session.
- Your data will be saved automatically to the file location you chose.
- Open the CSV file in Excel, Google Sheets, or any spreadsheet viewer to review logged vacuum data.

---

6. Cloud Logging (Optional)

- If connected to the internet, StrataCapture also logs your session to a unique page on Vacuum Network, allowing for real-time remote monitoring and collaboration.

Troubleshooting

- If your device is not detected, double-check:
  - USB/Serial drivers are installed correctly
  - COM port is not in use by another program
  - Device is powered and securely connected

Logging Data Using Torch

This section explains how to log vacuum and temperature data using a SNAP vacuum controller and a Torch Data Logger. **The Torch requires a SNAP that is temperature enabled to be used**. Inquire with Digivac to find out information about SNAP and temperature monitoring.

Requirements

- SNAP w/ Temperature Display option
- Torch Data Logger
- MicroUSB cable

---

1. Connect the Devices

Use the micro-USB cable to connect the Torch Data Logger to the SNAP.

---

2. Set up the system

Ensure the SNAP is properly connected to your vacuum oven setup.

---

3. Power On

Turn on both the SNAP and the Torch Data Logger if they aren't already powered.

---

4. Automatic Detection

Once powered, the Torch will automatically detect the SNAP. Stating "Device Connected".

---

5. Ready to Log

Press Start Run to begin logging.

---

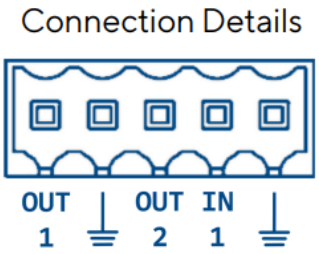
6. Need Help?

Refer to the "Torch Operation Manual" included with your Data Logger for detailed instructions.

Logging Data Using Analog Out

The SNAP Vacuum Controller offers two analog voltage outputs (OUT1 and OUT2) for real-time pressure data logging. These outputs can be connected to a PLC, data acquisition system, or any device capable of reading 0–10 V analog signals.

Note: OUT1 and OUT2 operate independently and provide simultaneous analog signals. Be sure to select the appropriate channel based on your required measurement range.



Requirements

- A receiving device (e.g., PLC, DAQ system) that accepts **0–10 V DC input**.
- Shielded cable is recommended for long runs to reduce noise

Sensor- Specific Output Scaling

775i Sensor

OUT1	OUT2
$Pressure = (Volts - 1) * 100$	$Pressure = 10^{Volts}$

For OUT1, 1V to 10V corresponds to 0 to 900 Torr. For OUT2, 1V = 10 Torr, 2V = 100 Torr, etc.

Quantum Sensor

OUT1	OUT2
$Pressure = 10^{Volts - 1}$	$Pressure = 10^{(Volts - 6.5)}$

10 Torr Capacitance Manometer

OUT1	OUT2
$Pressure = Volts$	$Pressure = (Volts - 1) * 100$

Note: OUT2 is set by the reading on the internal 775i sensor to allow readings above 10 torr.

Monitoring and Logging Data using Wifi

Once your gauge is connected to your workplace WiFi network, you can monitor vacuum readings remotely using either a terminal program (via Telnet) or a web browser through www.vacuumnetwork.org.

Monitoring and Logging via Telnet

1. **Obtain the IP Address**
   After setup, navigate to the IP Address screen in the gauge's WiFi menu to retrieve the static IP assigned to your device.

---

2. **Launch a Terminal Program**
   Open a terminal application such as PuTTY or Tera Term on your computer.

---

3. **Configure Telnet Settings**
   - Connection type: Telnet
   - Host Name (or IP address): Enter the IP address shown on the gauge
   - Port: 10001

---

4. **Start the Session**
   Once connected, the terminal will display live vacuum readings and setpoint values.

Refer to the DVCUP Command Reference section of this manual for details on sending commands to adjust setpoints or query vacuum readings.

Monitoring and Logging Via Vacuumnetwork.org

The SNAP controller supports both remote monitoring and data logging through www.VacuumNetwork.org, DigiVac's cloud-based vacuum portal. This guide outlines how to configure your SNAP gauge for online access and how to log data during a vacuum process.

Requirements

- SNAP controller is WiFi-enabled and powered on.
- Gauge is configured with a **Customer ID** and **Gauge ID**.
- The gauge is connected to your **workplace WiFi**.
- You have a web browser and access to VacuumNetwork.org.
- **Optional**: A DigiVac logging utility such as **StrataCapture** (or equivalent) if long-term session logging is required.

Monitor in Real-Time

Once your SNAP is connected to a workplace network:

1. **Open a web browser and enter the following URL**:
   http://www.vacuumnetwork.org/?id=YourCustomerID

   Replace YourCustomerID with the Customer ID you entered in the gauge configuration.

---

2. **A live webpage will open**, displaying real-time vacuum readings for all gauges associated with that Customer ID.

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3. **Each SNAP controller (Gauge ID) and its associated sensor channels will appear**. Values refresh approximately once every 10 seconds.

Note: Make sure you're connected to the workplace network, not the gauge's SSID.

Logging Vacuum Data to the Cloud

While VacuumNetwork.org is primarily for monitoring, the SNAP can also log vacuum data during a session using DigiVac's logging tool. Here's how:

Logging with StrataCapture

1. **Start a Logging Session**

- Open Stratacapture.
- Connect to the SNAP over USB or Telnet.
- Start a session (record button).

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2. **Cloud Sync**
    - During the active session, VacuumNetwork.org receives updates from the gauge (if connected to the internet).
    - This creates a live session visible via the web portal.

---

3. **Stop and View**
    - When you end the session, a copy is stored locally.
    - Logged sessions can be exported or retrieved from your local machine.

Note: The timestamp is captured and persists after the session ends.

Section 8: Specifications

Valves	Wetted materials: 304 Stainless Steel, Viton, and PTFE (teflon)
Range of Control	2 Torr to 775 Torr (50mTorr -760 Torr with External Sensor)
Accuracy, Control	+/- 5% of
Time to converge within 5%	reading <30 seconds
Integral Sensor	Sen 775i
Integral Sensor Accuracy	+/- 2 Torr
Integral Sensor Range	0.5 - 775Torr
Vacuum Path Orifice	Minimum orifice of 20mm
Minimum Bleed Valve Orifice	¼" or 6.35mm hose barb I.D.
Conductance	L/s: 36.44 L/m: 2186.4 CFM: 76.8884
Power	100-240VAC 50/60Hz
Dual Vacuum Control	Proportional throttle and proportional bleed control (vent to atmosphere) delivered from an integral dual valve module per channel
External Sensor	Upgrade to a 10 torr capacitance manometer for improved accuracy or DigVac Quantum Sensor for improved range
Output	Ability to be controlled remotely via USB or analog in/out for integration into larger systems
Recipes	Program ramps and holds vacuum at different duration and vacuum levels
Enclosure	9 ¼" width, 4 ¼" depth, 4 ¾" height
Certifications	CE, UL, CSA, (planned for 1H 2022) RoHS

Section 9: External Sensor Accuracy

Overall measurement accuracy is influenced by both the sensor and device accuracies. Users should account for sensor-specific tolerances in addition to the SNAP's full scale accuracy of ≤ ±0.01% of the sampled input (sensor) voltage.

Sensor Accuracy

Measurement accuracy is largely dependent on the External Sensor connected to the SNAP. Below is a list of gauges that the SNAP does or will support, and their associated accuracies as of the date of this printing.

Mfr.	Sensor	Type	Range	Accuracy (as percent of reading, unless noted)
DigiVac	DCP	Capacitance Manometer + Piezo	0.01 to 1,000 Torr	0.01 to 0.099 Torr: ± 3% 0.100 Torr to 9.99 Torr: ± 2% 10 Torr to 1000 Torr: ± 3%
DigiVac	DPP	Pirani + Piezo	1.0 x 10 -5 to 1000 Torr	7.5x10E-6 to 7.5x10E-5: ± 50% 7.5x10E-5 to 6x10E0: ± 14% 6x10E0 to 7.5x10E+1: ± 5% 7.5x10E+1 to 1000 Torr: ± 2%
DigiVac	DPCP	Capacitance Manometer, Piezo, + Pirani	1.0 x 10 -5 to 1000 Torr	7.5x10E-6 to 7.5x10E-5: ± 50% 7.5x10E-5 to 7.5x10E-3: ± 20% 7.5x10E-3 to 1000 Torr: ± 3%
Kurt J. Lesker	AGC 10 Torr	Capacitance Manometer	~ 3 decades below full scale	± 0.20%
Agilent	CDG-500 10 Torr	Capacitance Manometer	0.01-10 Torr	± 0.20%

For more information on **SNAP Sensor Calibration** please reach out to our technicians at tech_support@digivac.com or Call **732-765-0900**, they will be able to provide assistance and our Calibration Manual upon request.

Section 10: Understanding Torr

Many vacuum instruments, including this one, are calibrated in **Torr**, a unit of **absolute pressure**.

At sea level, the pressure of the atmosphere is approximately 14.696 psi (pounds per square inch), commonly rounded to 14.7 psi. This pressure results from the weight of the air in the Earth's atmosphere pressing down on each square inch of surface.

One Torr is defined as the pressure exerted by a 1-millimeter column of mercury (mmHg). Pressure can also be expressed in milliTorr (mTorr), where:

- **1 Torr = 1,000 milliTorr**
- **1 milliTorr = 1 micron**

***Note:** The terms milliTorr and micron are interchangeable and both refer to 1/1000 of a Torr.

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 (~ 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 one half inch in a single day are common.)

The term **"vacuum"** refers to any pressure lower than atmospheric pressure—what we often think of as "suction." While using **atmospheric pressure** as a reference is acceptable for moderate vacuum levels (down to about **27 inches of mercury**), it becomes less practical at deeper vacuum levels.

In such cases, it is more meaningful to use **absolute pressure**, which is measured from **absolute zero pressure** (a perfect vacuum) rather than from atmospheric pressure.

Section 11: Instrument Updates and History

Version	Release date	Feature updates
22A18	2022-02-04	SNAP Stratacapture support added.
22L16	2023-1-20	Made improvements to analog in functionality.
23G13	2023-10-23	Adds in external vent valve
24A16	2024-01-16	Bug fixes.
25D01	2025-4-06	This code version improves upon motor control routines, UI functionality, and adds temperature features to the SNAP. Can also be used as a cart.

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