SMART BUTTERFLY COMMANDVALVE®

IdealVac.com

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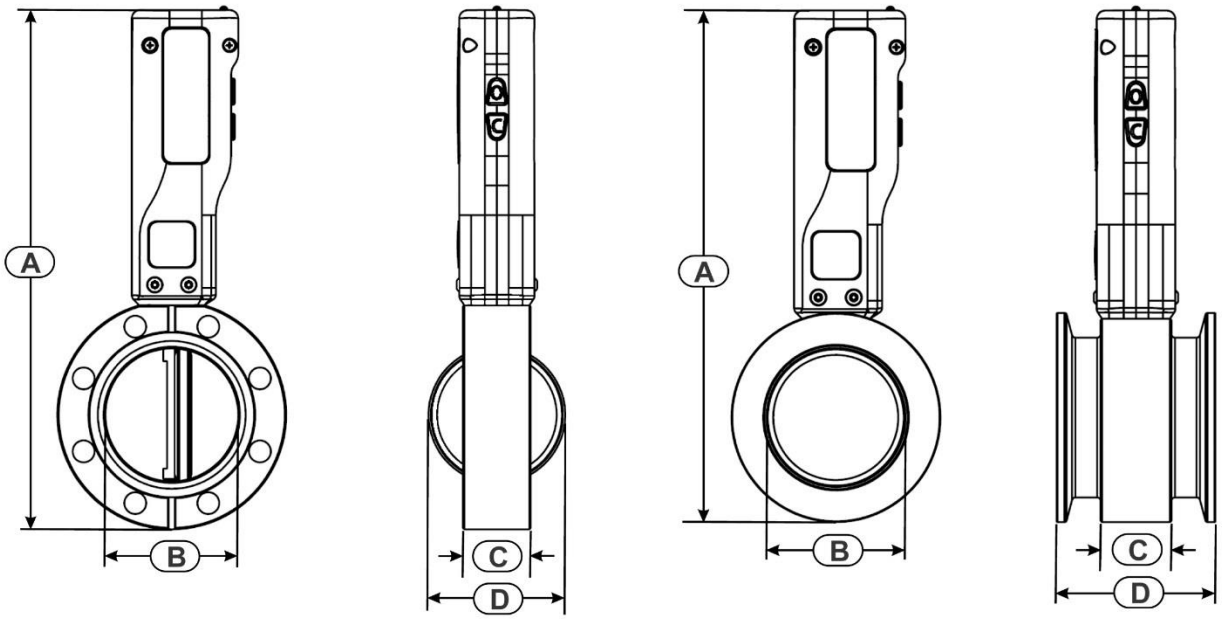
Specifications

Conductance (liters/second)	
KF-16 and CF 1.33	3
KF-25 and CF 2.125	10
KF-40 and CF 2.75	30
KF-50 and CF 3.375	85
Specification	
Leak Rate	$1.0x10^{-9}$ std cc/sec
Operating Temperature Range	0 to 50 °C
Open to Close Time	270 milliseconds
Position Resolution	< 0.5°
Materials Within Vacuum	
Valve Body	304L Stainless Steel
Valve Butterfly	304L Stainless Steel
O-rings	Viton or Kalrez (Chemical Resistant Series)
Power Requirements	
Valve Power Consumption (Idle)	0.78 W
Valve Power Consumption (Moving)	5.58 W
AC/DC Wall Plug Adapter	(100 – 240 VAC, 50-60 Hz) to (12 VDC, 1A)

Dimensions



CF Style Flange **KF Style Flange**

CommandValve Butterfly Valve dimensions, in inches (mm).

Flange Type	A	B	C	D	# of Holes	Torque (in-lbs)
CF 1.33	5.63 (143.0)	0.59 (15.0)	1.00 (25.4)	0.64 (16.3)	6	28
CF 2.125	6.41 (162.9)	0.94 (23.9)	1.0 (25.4)	0.99 (25.2)	4	110
CF 2.75	7.07 (179.5)	1.48 (37.6)	1.0 (25.4)	1.53 (38.9)	6	110
CF 3.375	7.709 (195.8)	1.96 (49.8)	1.0 (25.4)	2.02 (51.2)	8	190
KF-16	5.73 (145.6)	1.50 (38.1)	0.59 (15.0)	0.64 (16.3)	N/A	N/A
KF-25	6.42 (162.9)	0.94 (23.9)	1.0 (25.4)	2 (50.1)	N/A	N/A
KF-40	7.07 (179.5)	1.48 (37.6)	1.0 (25.4)	2.25 (57.2)	N/A	N/A
KF-50	7.27 (184.8)	1.96 (49.8)	1.0 (25.4)	2.25 (57.2)	N/A	N/A

Standard Series Purchasing Options (Viton Sealed O-rings)

CF Flange		KF Flange	
Flange Size	Part Number	Flange Size	Part Number
CF 1.33	P108517	KF-16	P108390
CF 2.125	P108436	KF-25	P108389
CF 2.75	P108437	KF-40	P108388
CF 3.375	P108438	KF-50	P108185

Chemical Resistant Series Purchasing Options (Kalrez Sealed O-rings)

CF Flange		KF Flange	
Flange Size	Part Number	Flange Size	Part Number
CF 1.33	P108991	KF-16	P108995
CF 2.125	P108992	KF-25	P108996
CF 2.75	P108993	KF-40	P108997
CF 3.375	P108994	KF-50	P108998

The above tables are a summary of the available Ideal Vacuum CommandValve part numbers to simplify purchasing. Please visit idealvac.com or call (505) 872-0037 for questions.

Chemical Resistant Series (Application Notes)

Our butterfly valves are not hermetically sealed. They include O-rings on the valve stem. **DO NOT** use our CommandValves in applications where acutely toxic chemicals are present!

For the safety of our customers, **DO NOT** use our CommandValves in applications which contain **ACUTELY TOXIC CHEMICALS**! Our butterfly valves are not hermetically sealed, they include O-rings on the valve stem. Even though, our CommandValves design has been laboratory proven to withstand pressures as high as 150 PSI without leaking, the stem O-ring seals are a potential weak point of the design, they could start to leak when process containments deposit on the shaft stem.

Our chemical resistant series CommandValves include Kalrez® perfluoroelastomer O-ring parts which can withstand attack from more than 1,800 chemicals, solvents, and plasmas. This product line delivers outstanding performance in aggressive process environments. Kalrez O-rings exhibit minimal chemically induced swelling, which can cause O-rings and sealing components made of other elastomers to extrude out of seal grooves, resulting in seal failures. Kalrez® parts resist extreme volume swell when exposed to a wide variety of chemicals and solvents, including concentrated nitric acid, sodium hydroxide, ethylene diamine and steam. They have proven to be a cost-effective solution in sealing situations that require the greatest resistance to harsh chemical environments and higher temperatures.

Our chemical resistant CommandValves include Kalrez 6375 which is well suited for use in mixed process streams because of its excellent resistance to acids, bases, and amines. It is also recommended for use in hot water, steam, pure ethylene oxide and propylene oxide. The Kalrez spectrum of products includes different versions which can be selected, for resistance to acids, amines, plasma, ultrapure de-ionized water or strong bases. Please call our application engineers at (505) 872-0037, for questions about chemical compatibility.

Valve Accessories

KF Flanged CommandValve Accessories				
Description	KF-16	KF-25	KF-40	KF-50
O-Ring (Viton O-ring)	P101242	P101243	P101243	P101245
Hinge Clamp Wing Nut	P101198	P101199	P101200	P101201
Bulkhead Clamp	P104598	P104599	P104600	P104601
O-ring Seal Kit (Viton)	P108968	P108970	P108972	P108974
O-ring Seal Kit (Kalrez)	P108969	P108971	P108973	P108975

Conflat Flanged CommandValve Accessories				
Description	CF 1.33	CF 2.125	CF-2.75	CF 3.375
Copper Conflat Gasket	P102277	P104337	P102278	P102279
Viton Conflat Gasket	P104339	P104340	P104341	P104342
Silver Plated Bolt Kit	P108981	P108980	P108980	P108979
O-ring Seal Kit (Viton)	P108968	P108970	P108972	P108974
O-ring Seal Kit (Kalrez)	P108969	P108971	P108973	P108975

What's Included

Included in your order of our electric driven CommandValve is:

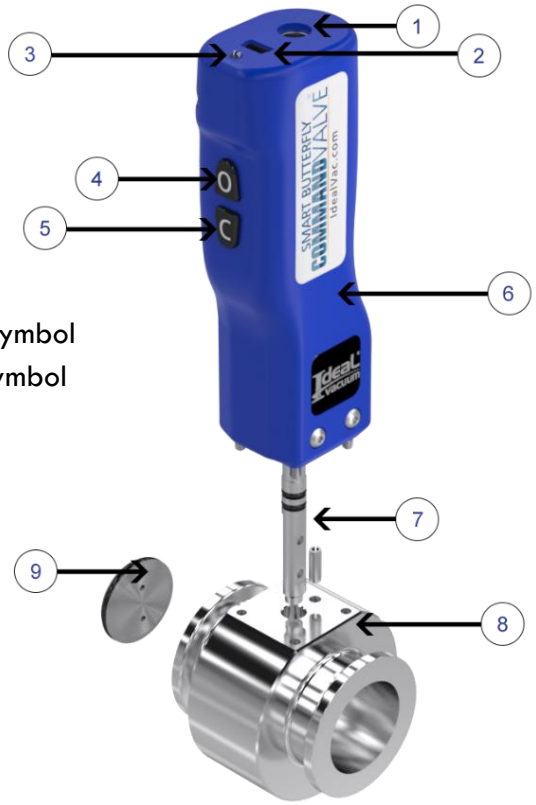
- Ideal Vacuum CommandValve
- AC/DC Wall Plug Mount (100-240 VAC, 50/60 Hz) to (12 VDC, 1 Amp) power supply adapter (P108978)
- USB-A to USB-B mini cable (P108977)
- USB drive which contains a copy of the CommandValve application software, user's manual, sample system integration code for program languages (VB.net, C, LabView, and Python), for use with Windows PC, Mac, and Linux operating systems.

Key Features

Our Ideal Vacuum CommandValve butterfly valves are the perfect solution for vacuum system integration, automation, and control. Some of the key features of our CommandValves are shown below:

Key features of the CommandValve.

1. Female socket for the 12 VDC power supply.
2. USB-B mini connection for communication to the CommandValve.
3. LED position indicator.
4. Open push button, “soft key” labeled with “O” symbol
5. Close push button, “soft key” labeled with “C” symbol
6. Valve controller body.
7. Valve stem.
8. Valve body.
9. Butterfly with O-ring



Local Operation (Quick Start Procedure)

Our Ideal Vacuum CommandValve electric butterfly valves can be operated locally (see our quick setup steps in the figures below).

Step 1: Provide power to the CommandValve using supplied AC/DC adapter

The CommandValve is shipped with a power supply that is suitable for a wide range of input voltages and frequencies (100-240 VAC, 50/60 Hz). The valve will be powered on when connected to the 12 VDC power supply plug, insert connector into the DC socket (1), see key features above. When power is first supplied, the CommandValve performs a homing sequence. Homing allows the software to determine the fully closed "Home Position".

After the homing sequence, the butterfly will return to an angular position of 0° (default value), this position can be configured in our supplied software. After the homing sequence, the LED indicator (3) will be illuminated and the valve is ready for use.

Step 2: Press Open or Close buttons on the side of the valve controller body.

The CommandValve can be controlled locally through the push buttons on the valve's controller body.

Local control of the valve can be done in two modes:

- **Full Open/Close Mode** (single button pressed to open or close complete).
- **Incremental Mode** (set butterfly angle to any position between full open or closed).

In **Full Open/Close Mode** the valve will go to the full open position (butterfly at 90°) when the open "soft key" button is pressed, see item 4 of key features above. Vice versa, if the close "soft key" button is pressed (item 5 above), the valve will go from the current position to the fully closed position.

In **Incremental Mode**, the valve's butterfly angle can be changed when the user momentarily presses the open or close soft keys.

To switch between **Full Open/Close Mode** and **Incremental Mode**, depress and hold both "soft key" buttons. The LED indicator will flash temporarily, indicating that the mode has changed.

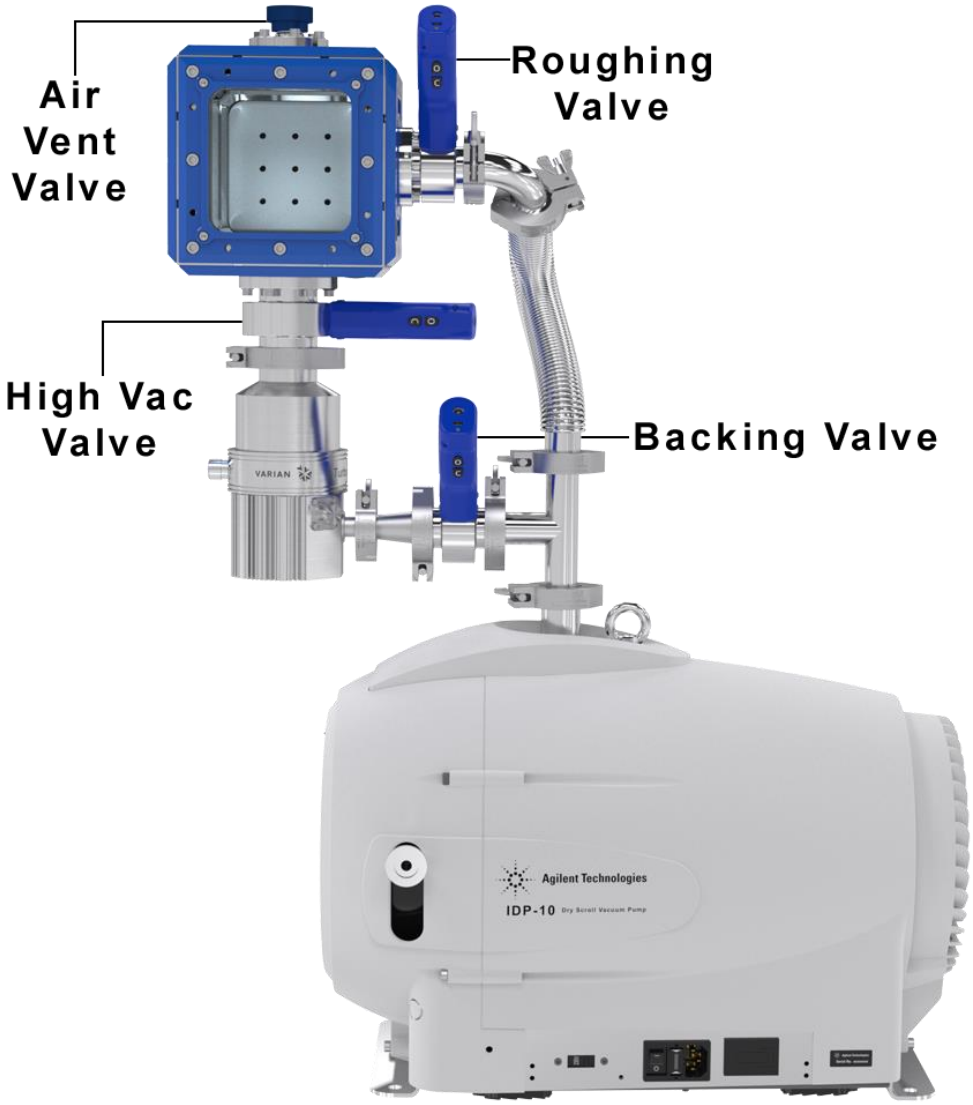
CommandValve Installation

	**WARNING** **Failure to observe instructions could delay installation.**	Please complete and test all automation and control operations of the CommandValve before installing it into your vacuum system. It is beneficial to have direct eye sight with the butterfly when testing control functions.

Typical CommandValve Applications
As Roughing, Backing, And High-Vacuum Valves

Our Ideal Vacuum CommandValves are used as roughing or backing valves to control the flow of gas from the vacuum system or high vacuum pump to the roughing pump. The figure below shows

a typical example of a high-vacuum system that includes two CommandValves (displayed as **roughing valve** and **backing valve**), one to control roughing of the top chamber and one to control backing of the turbomolecular pump exhaust port. In a typical high-vacuum system like this, with the **high-vacuum valve** closed, **backing valve** open, and **roughing valve** closed, the chamber is vented to atmosphere. After work inside the chamber is completed the **high-vacuum valve** remains closed, **backing valve** is closed, and **roughing valve** is opened to start roughing down the top chamber. When the chamber reaches the crossover pressure, the **roughing valve** is closed, the **backing valve** is opened, and the **high-vacuum valve** is opened. Our Ideal Vacuum CommandValves allow easy automation of these types of systems. (Air Vent Valve)



Our CommandValves are applicable for use as flow control valves in high-vacuum applications. The O-ring seals inside our CommandValves are compatible with high-vacuum pressures down to

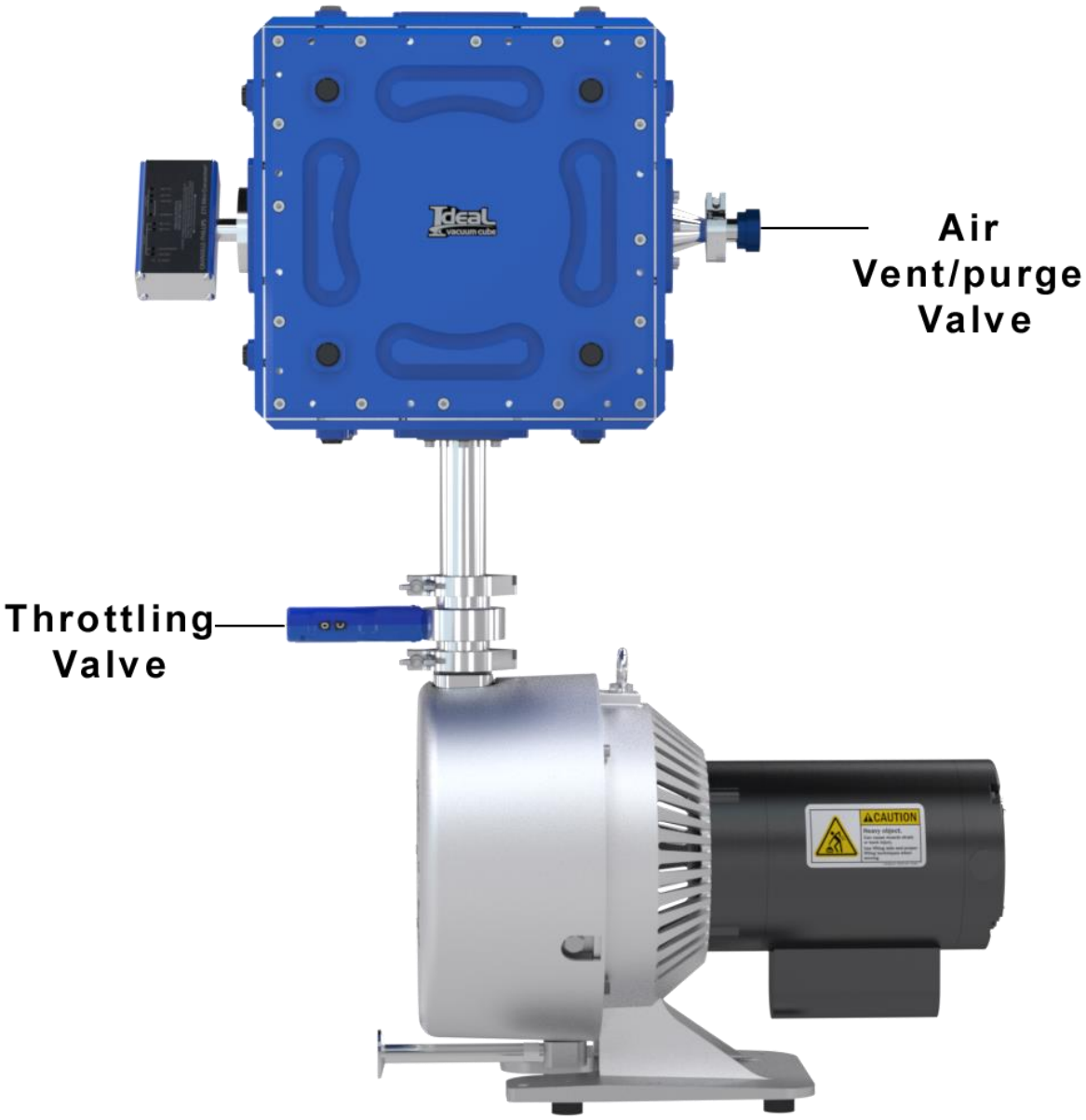
3x10-8 Torr, which is the typical ultimate pressure for KF- and ISO-flanged turbomolecular vacuum pumps. Additionally, our CommandValves are electrically operated and are controlled by low voltage, whereas gate valves are either manual or pneumatic (making the system more complicated as they require pressurized air and electric solenoid valves).

	**WARNING** **Butterfly protrudes beyond the flange surface.**	Care should be taken when designing a system which includes our Conflat flanged CommandValve as the high-vacuum valve. The butterfly extends some small distance beyond the CommandValve flange and should not allowed to contact turbomolecular pump rotator or inlet

There could be some issues if our CommandValve is mounted directly on top of a CF flanged turbomolecular pump as the butterfly tends to protrude a small distance beyond the CommandValve flange surface, when the butterfly is in the fully opened position (see failure in figure below).

In these cases, we recommend adding a short full nipple section between the turbopump and command valve flanges (see photo above). These short section Conflat full nipples are sold separately as part numbers; P102207 for CF 2.75 and P108986 for CF 3.375 CommandValves.

Our conflat flanged version of our CommandValve still have O-rings on the valve stem which prevents them from being suited for ultra-high vacuum pressure ranges, less than 10-8 Torr.



As Exhaust Throttle Valve

Another common application of the CommandValve is in exhaust throttling applications, where a desired pressure is maintained inside the vacuum chamber. In these applications, our CommandValves are used to control the amount of gas that is removed from the vacuum system by the vacuum pump (see figure below). Because the CommandValve can be set to any angle between 0 and 90°, within a 0.5° accuracy limit, the CommandValve provides a means to regulate the removal rate flow of the chamber gases. In these applications, a purge valve is installed on the

vacuum system to supply a constant low flow rate of gas into the vacuum chamber, a pressure gauge is used to monitor the pressure in real-time, and a CommandValve is inserted in the vacuum line between the chamber and the vacuum pump. With the CommandValve under computer control, the software program monitors the chamber pressure and constantly adjusts the CommandValve's butterfly angle to throttle the evacuated gas flow rate so that the desired chamber pressure is maintained.

When designing these systems, the vacuum pump needs to have enough pumping speed to overcome the purge valve flow rate, at least enough to drop the chamber's pressure to the desired target pressure range. A well-designed throttling system should also consider the conductance of the vacuum tubing.

When throttling of a high-vacuum application the vacuum system designer should consider the maximum flow-rate which will overwhelm the high-vacuum pump. For example, if a turbomolecular pump is operated at alleviated pressures (typically between 0.5 to 10 Torr, the specific limits will depend on your turbo pump's individual design), the turbo motor will run hot from the high amp load, this will result in a shorter life of the turbomolecular pump's bearings, leading to premature pump failure. When operating a turbo under throttling conditions where the load reaches the manufacture's limits of the pump, we recommend water cooling of the turbo pump over the less effective method of air cooling.

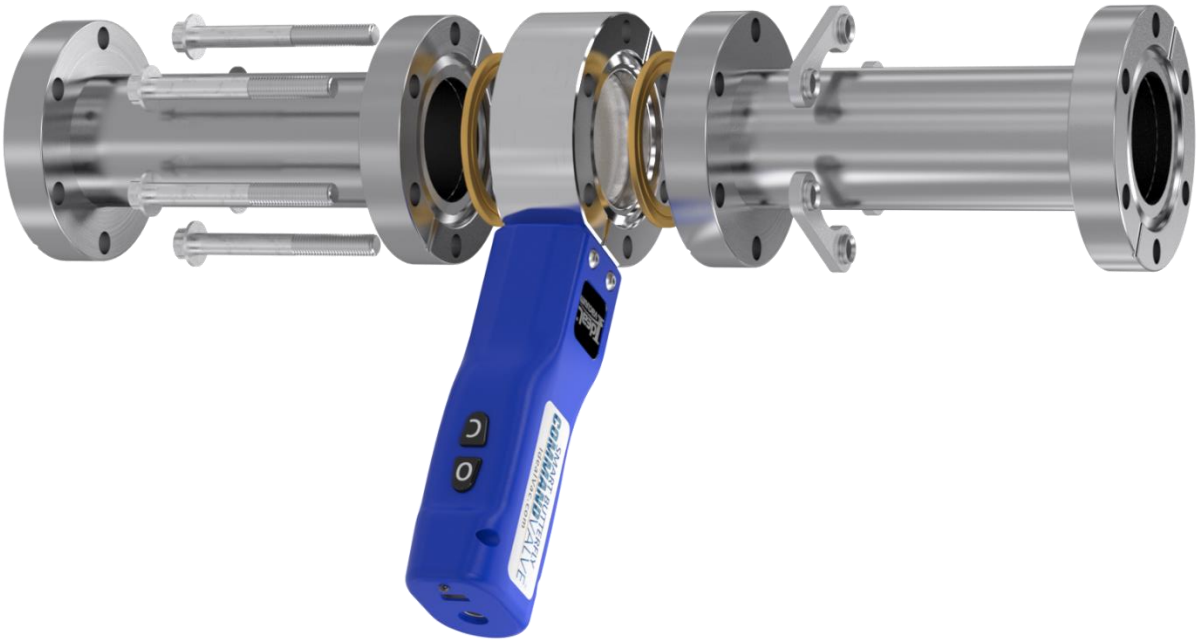
Vacuum Flange Connections

Installation of the Ideal Vacuum CommandValve will depend on the vacuum flange type. The valves are available in KF and CF flanges. Installation of the two styles of flanged CommandValves are described in the following subsections.

	**WARNING** **Failure to follow instructions could damage the valve.**	Take care not to scratch the vacuum flanges or the ultimate vacuum of the system will be compromised. When placing the CommandValve on the work surface, please place it so that the gas flow direction is parallel with table top.

KF Style Flange Valves

To install a valve with KF style connections, mate the KF face of the CommandValve to the face of the same size KF flange using a KF centering ring (see figure above). Wrap a KF-clamp around the faces and tighten the wing-nut until the seal is tight, repeat on the opposite side of the valve. The KF connection is appropriate for applications requiring vacuum down to 3x10-8 Torr.



CF Style Flanged Valves

Our conflat flanged CommandValves are designed with through bolt holes and the vacuum installation procedure resembles that of a double-sided CF flanged fitting. To install our CF flanged CommandValve into a conflat manifold requires two copper gaskets, the two mating CF flanged fittings, and a silver plated double-sided flange through-hole bolt kit (the bolt kit part numbers are listed in the Conflat Flanged CommandValve Accessories section above). To install a valve with CF style flanges, begin by installing the bolts through the left mating conflat vacuum fitting bolt holes (see figure below), then put your hand behind the flange so that the bolts cannot slide back out, and orient the fitting so that the bolt threads are pointing up.

Inserting a copper or Viton gasket (depending on your application) onto the now horizontal knife edge of the conflat flanged fitting. Next step is to carefully place the Command valve over and rotate to the desired angle, then slid down over the threads of the bolts. Inspect that the sealing gasket is in the correct location as the two flanges come together. Try to keep those flanges together and keep the bolts from siding out while as we continue. Next, place the second gasket onto the top knife edge of the CommandValve and center it. Position the second conflat flanged fitting over the bolt threads and rotate to the desired angle, slowly lower the flange while the bolt threads slide through the fitting's bolt holes. Add the washers and nuts to the threads sections of the bolts and tighten with fingers. At this point the assembly should be stable and will not fall apart.

The remaining step is to tighten the fastener hardware in a diagonal crossed flange fashion by working around the flange until the corresponding torque is reached (see torque specifications in the following table). Our CF flanged CommandValves contain O-ring seals on the valve stem which will limit the chamber pressure to that of an O-rings sealed system, typically 3x10-8 Torr ultimate pressure.

	**WARNING** **Failure to follow instructions could damage the valve.**	Our conflat flanged CommandValves have a maximum operating temperature of 50 °C and are therefore not compatible with the high bakeout temperatures required in ultra-high vacuum systems.

Recommended Conflat Flange Bolt Set Torque Values		
CF Flange OD	Bolt Size	Torque (in. lbs.)
1.33	8-32	28
2.125	1/4-28	110
2.75	1/4-28	110
3.375	5/16-24	190

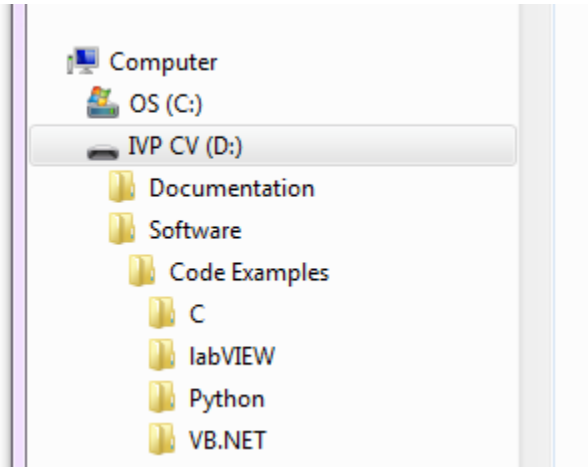
	**WARNING** **Failure to observe instructions could damage the valve.**	It is highly recommended that silver-plated fasteners be used to reduce the risk of the hardware getting seized. Our bolt kit part numbers are listed in the Conflat Flanged CommandValve Accessories section above.

We recommend that our silver-plated bolt kits be used when installing conflat flanged CommandValves. Silver-plating on the stainless-steel hardware acts as a dry thread lubricant which prevents seizing and galling. Our silver-plated hardware eliminates the need for the messy paste-type thread lubricants.

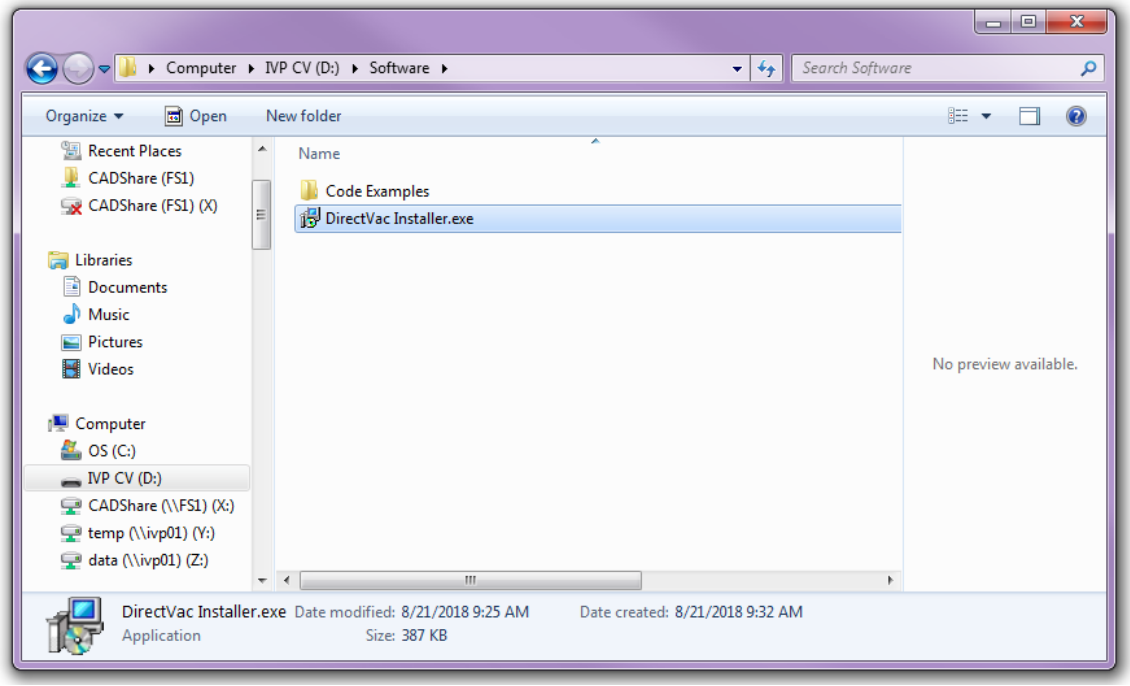
Software Installation (For Windows Operating Systems: Windows 7, 10, etc.)

To operate the CommandValve through the USB connection by a computer which has a Window's operating system the user will need to install our DirectVac software and driver. The supplied USB drive contains our DirectVac software, the CommandValve user's manual, along with a Programmer's Guide to remotely control the CommandValve using the USB virtual serial

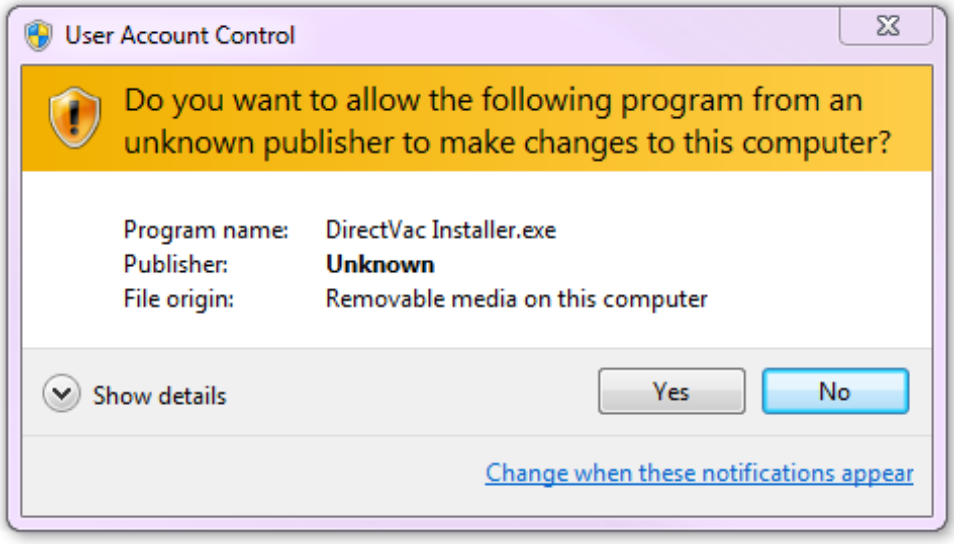
interface for Windows, Mac, or Linux operating system. We have provided sample code for VB.net, C, National Instruments LabVIEW, and Python.



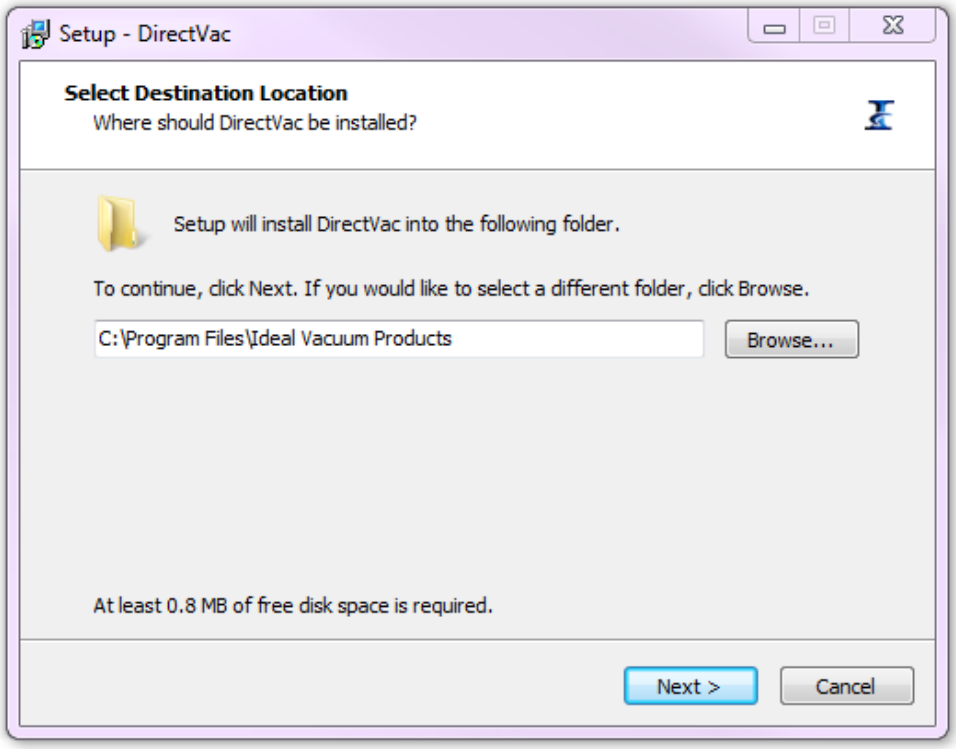
Step 1. Insert supplied USB drive with software into computer's USB port. Use windows explorer to browse to the USB folder and click on the **DirectVac Software Installer.exe** to begin the installation.



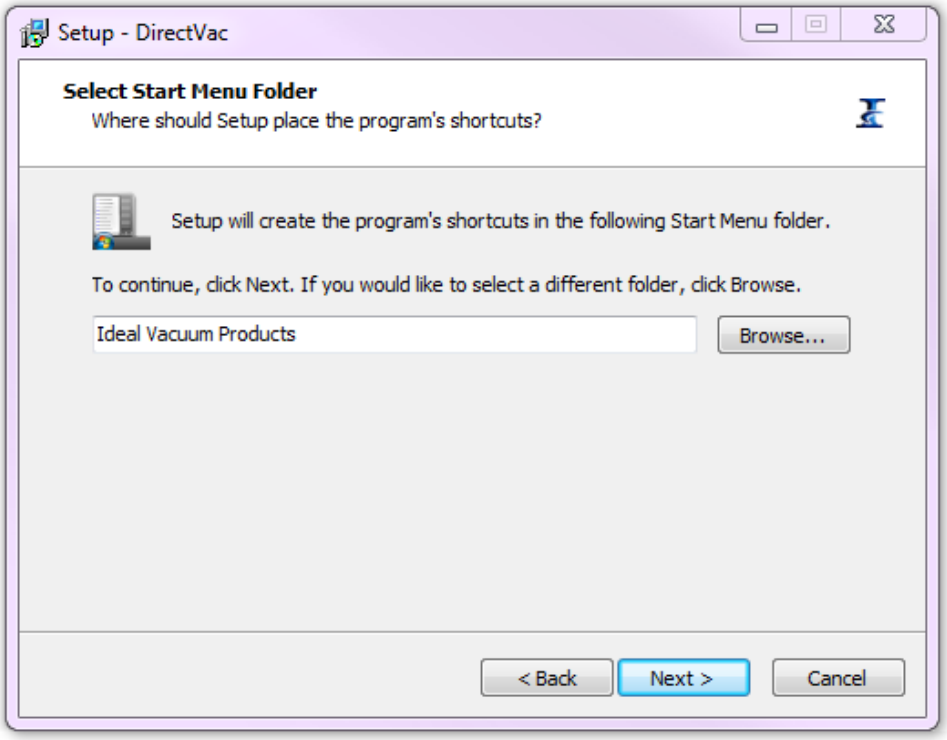
Step 2. User should select "yes" to allow the installer to make changes on the computer.



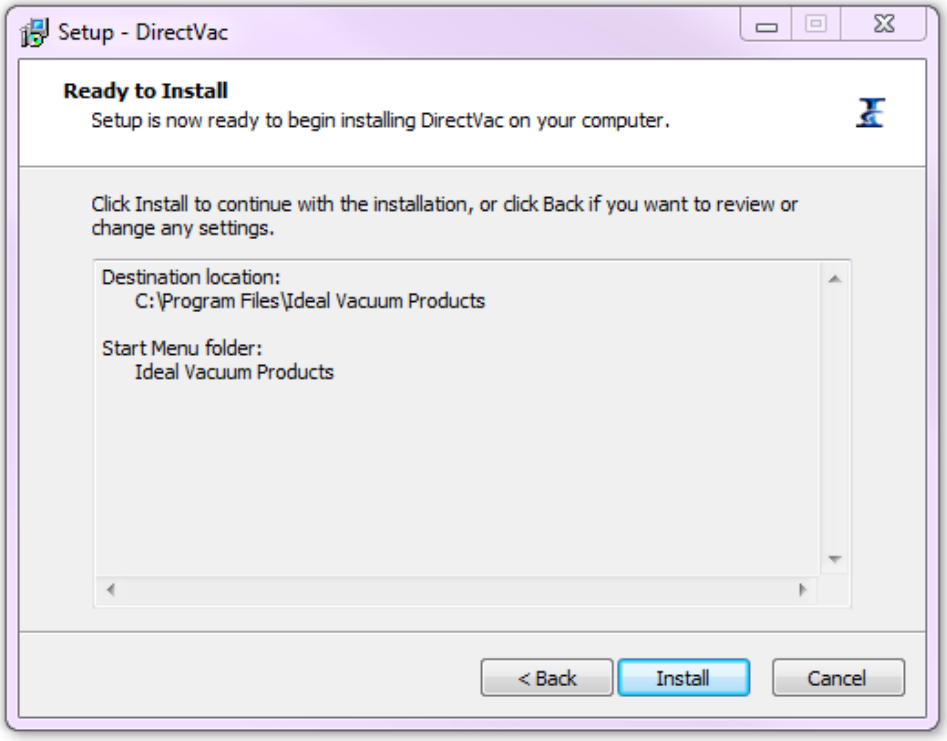
Step 3. The user can select where they would like the CommandValve DirectVac Software to be on their computer.



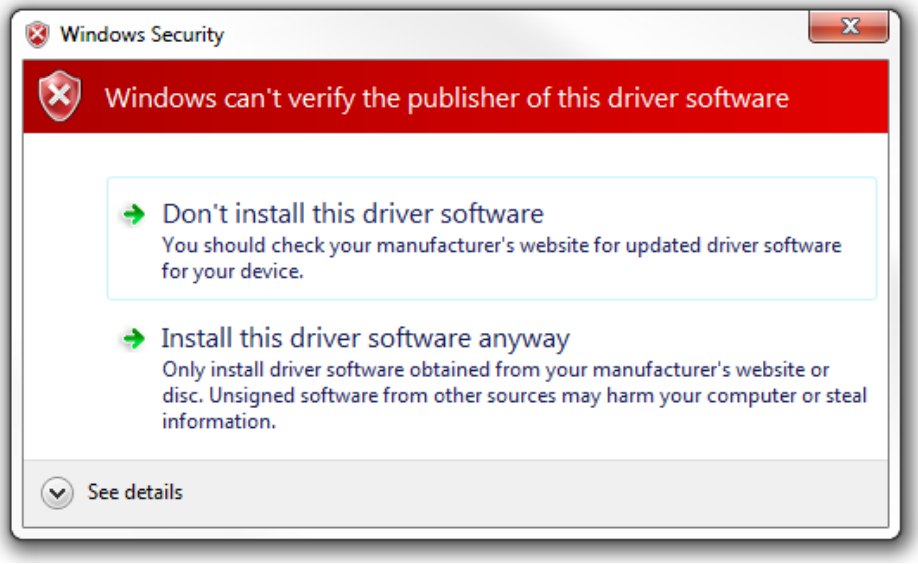
Step 4. User can select where they would like a shortcut of the CommandValve DirectVac software to be on their computer.



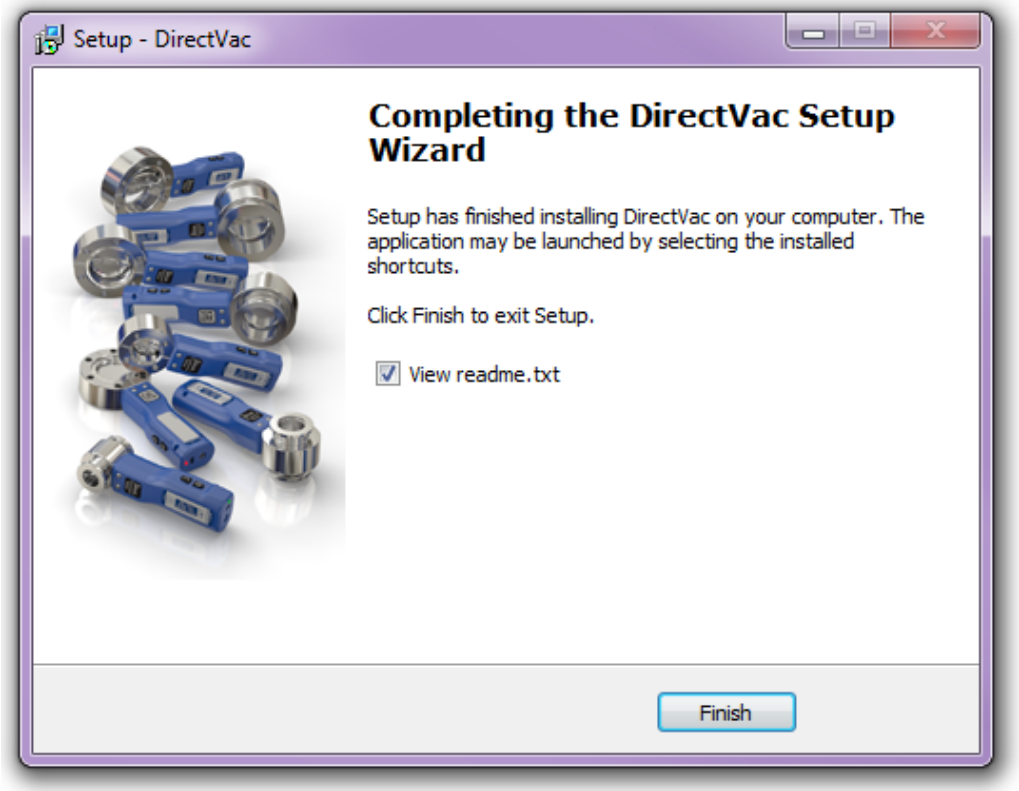
Step 5. Ready to Install, click Install.



Step 5. A verification to install the included device driver. Select "Install this Driver Software Anyway."

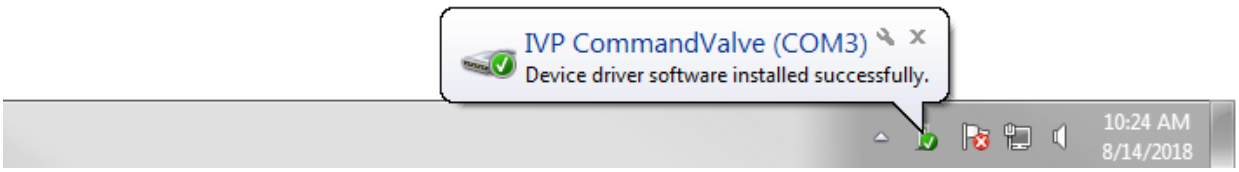


Step 6. A completion window letting the user know that installation is complete. An option to view "readme.txt" is available. Select "**Finish**" to exit the Installation Wizard.

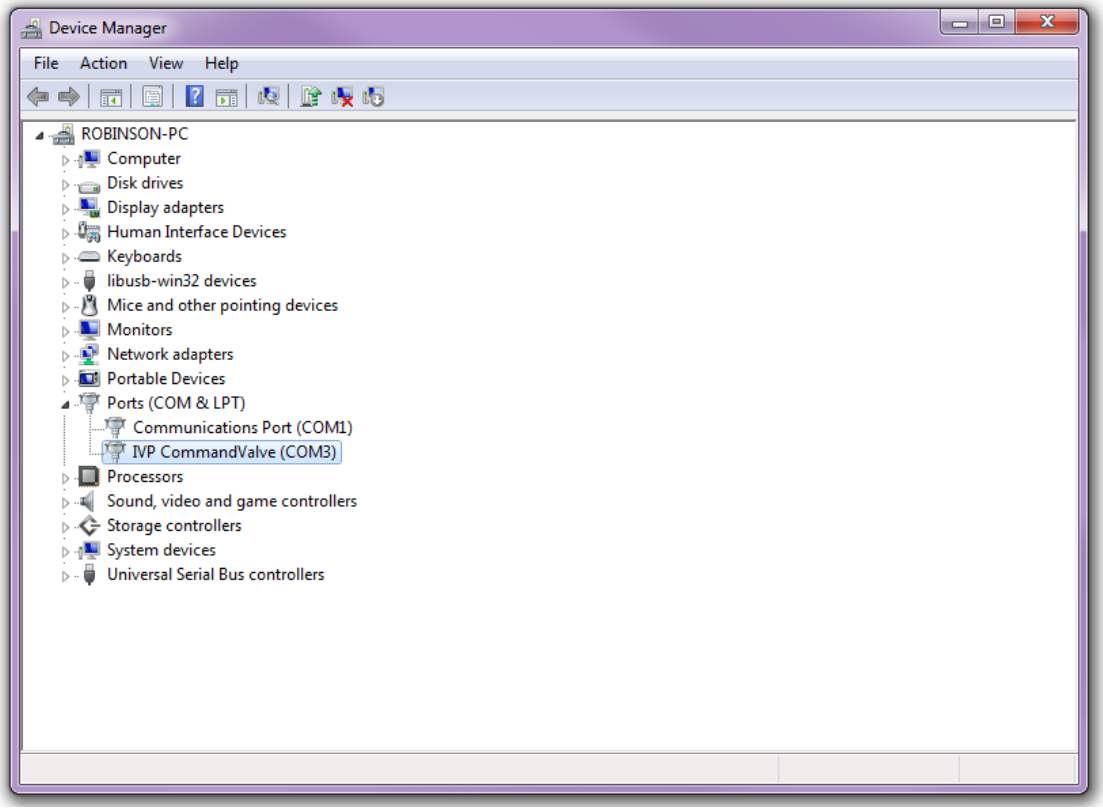


Step 7. After the installation, connect CommandValve to 12 VDC power supply. The valve will perform a home sequence. Connect CommandValve to computer through the supplied USB-A to USB-B mini cable.

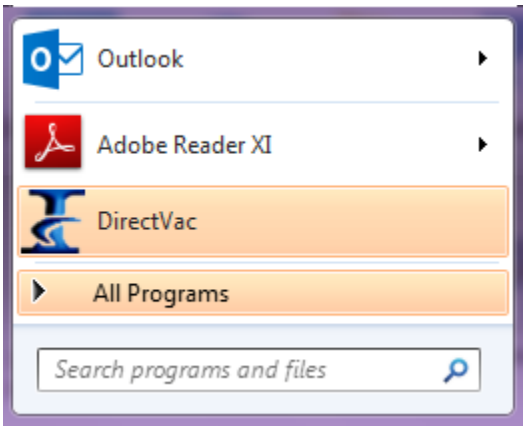
Step 8. When the valve is connected to the computer, the computer will recognize the device and the balloon pop-up will show up on the user's computer. The balloon pop-up also indicates that the CommandValve is connected on **COM port 3**, the actual COM Port number will vary on the user's computer. Knowing the COM port number is useful if the user wants to communicate through a program that they have written.



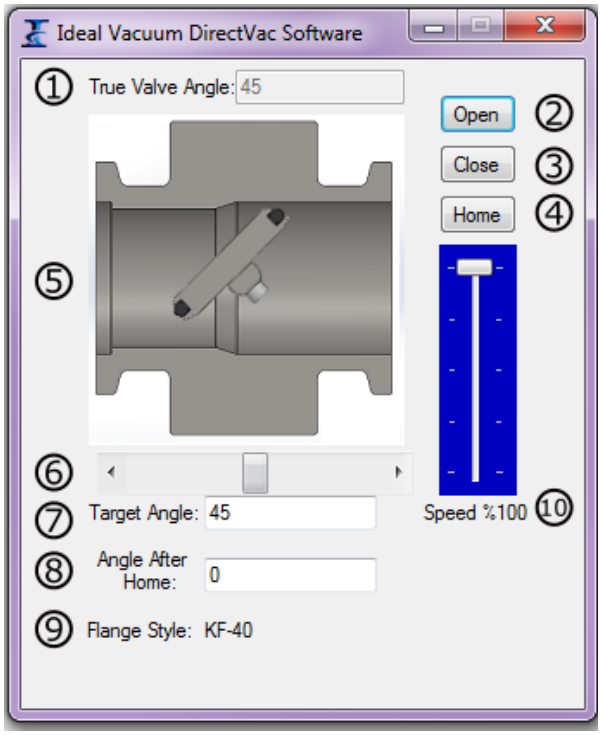
Step 9. The user can verify through the **Device Manager** that the valve has installed correctly, if the valve is listed under the Ports drop-down in the **Device Manager**. The CommandValve is listed under **COM3** in this example.



Step 10. To run our **Ideal Vacuum DirectVac** software for the CommandValve, navigate to the Start Menu and double click the **DirectVac** program (or navigate to the directory in which the software was installed). The CommandValve can now be controlled via the application software.



Step 11. Controlling the CommandValve with the supplied **Ideal Vacuum DirectVac** software program.



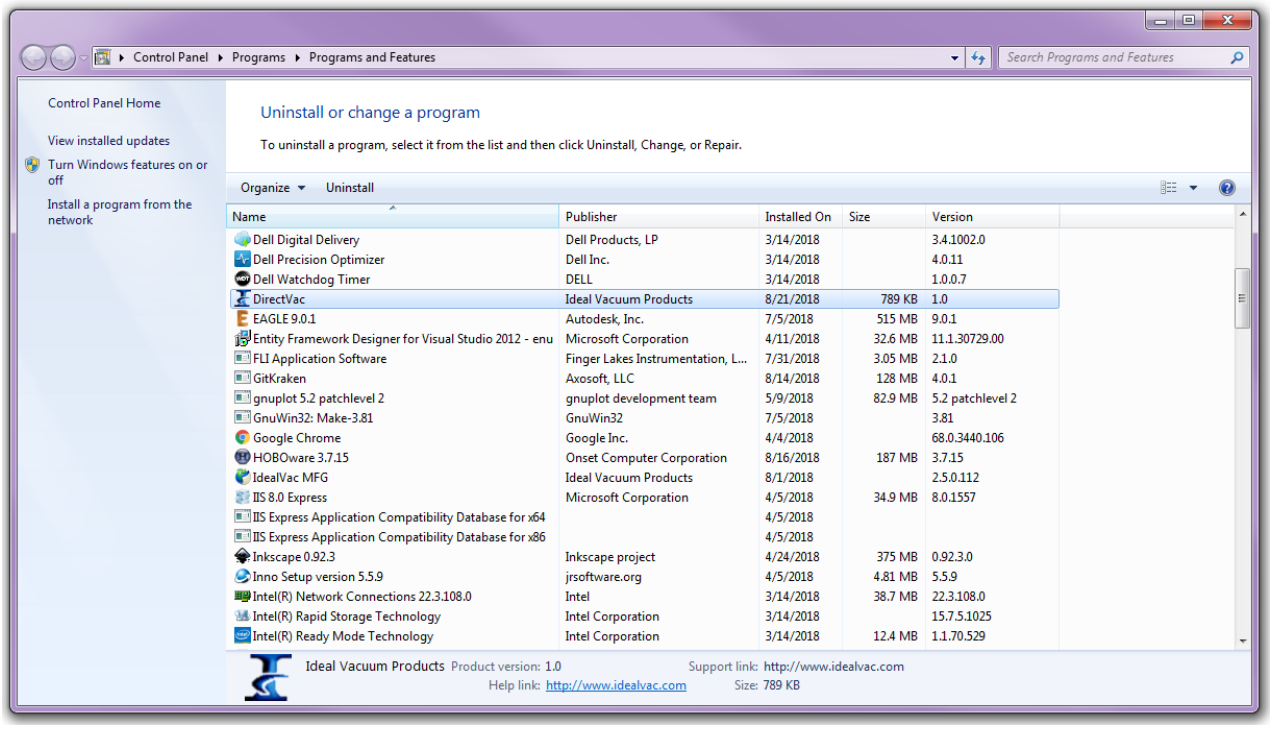
Windows OS users have the option to use our **Ideal Vacuum DirectVac** software shipped with the CommandValve. Upon starting, the software will automatically identify the valve on the appropriate COM port on which it is connected (the figure above shows the **DirectVac** software with the major components listed and their functions).

1. True Valve Angle: The current angle, in degrees, of the butterfly valve.
2. Open Button: Fully open the butterfly valve to 90°.
3. Close Button: Fully-close the butterfly valve to 0°.
4. Home Button: Preform a homing sequence to calculate the mechanical backlash.
5. Butterfly Animation: Visualization of the position of the butterfly valve.
6. Angle Scroll Bar: Slide the scroll from left-to-right to move the butterfly from 0° to 90°, respectively.
7. Target Angle: Enter an angle value in degrees and press enter to send the butterfly to that position.
8. Angle After Home: The angle to return to after the homing sequence.
9. Flange Style: The flange style of the CommandValve connected.
10. Speed Scroll Bar: Slide the scroll bar from bottom-to-top to adjust the speed from the minimum speed the valve can rotate to the maximum speed that the valve can move.

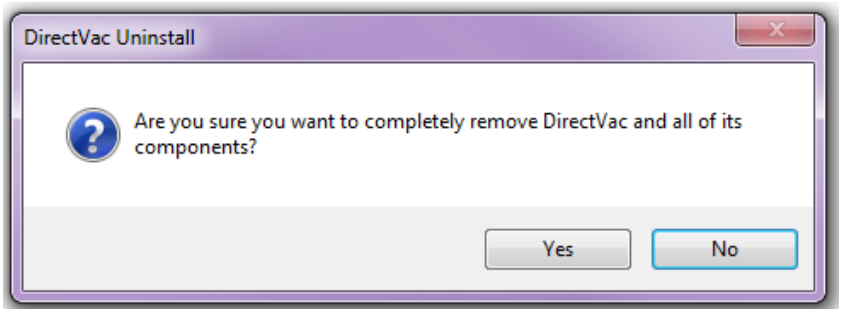
To integration a CommandValve into your current vacuum system automation software or to write your own CommandValve control program, please see the “Serial Port Communication” and “Code Examples” section below.

Uninstalling Software (For Windows Operating Systems: Windows 7, 10, etc.)

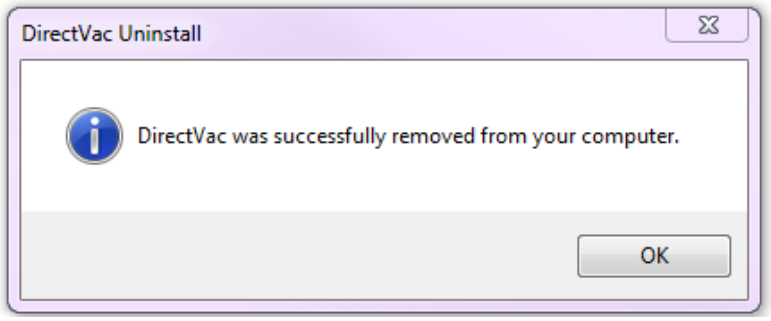
Step 1. The user can search for the Uninstall DirectVac Software in the **Uninstall or Change a Program** in the **Control Panel**.



Step 2. A pop-up will ask the user if they are sure they want to uninstall. Select "**yes**".



Step 3. A pop-up indicating that uninstall was complete successfully.



CommandValve Control Overview

The CommandValve can be operated in the following ways:

- Locally using the push buttons on the CommandValve (see previous section).
- Remotely using our provided DirectVac software (Windows operating system only, see above).
- User written software to remotely control the CommandValve using the USB virtual serial interface (for **Windows**, **Mac**, or **Linux** operating systems). We have provided sample code for **VB.net**, **C**, **National Instruments LabVIEW**, and **Python** languages in our Code Examples section below.

Serial Port Communication

Precision control of the CommandValve is also available through the valves USB port connection using the supplied USB-A to USB-B mini cable. The CommandValve can then be controlled by sending serial commands to the valve (see **Serial Command List** below). For more advanced user's, using Windows, Macintosh, or Linux operating systems, serial commands can be sent to the CommandValve either through a **RS-232 Serial Terminal** application (e.g., HyperTerminal, **IVP Simple Serial**) or through a user written application (see Code Examples for details below). We have provided a VB.net program example that builds our **IVP Simple Serial** program. We have also supplied a compiled version of **IVP Simple Serial** so that the user can quick get started sending serial commands (also see VB.net code sample below).

For USB communication, connect the USB-A end of the provided USB cable to the host computer and the USB-B mini end of the cable to the CommandValve. How the user proceeds will depend on the host computer's operating system.

Mac OS

The CommandValve does not come with application software that will run on a Mac OS platform. However, the valve can be controlled through the serial interface. To identify the serial interface for the valve, open the Terminal (the Terminal is located in the Utilities folder). Connect the CommandValve to the computer through the USB cable provided. In the Terminal type **ls -ltr /dev/** and press enter. This will list the most recently connected devices with the most recent being the last listed. Near the bottom of the list there will be a device "cu.usbmodemXXXX" where the XXXX will be value specific to the user's machine. This device can be used to communicate with the valve. See "Code Examples" for an example of how to write a simple program to control the valve through the serial interface.

Linux

The CommandValve does not come with application software that will run on a Linux operating system. However, users can control the valve through the serial interface. First, the valve must be identified. Open the Terminal and enter **ls -ltr /dev/**. This will list the most recently connected devices with the most recent being the last listed. Near the bottom of the list there will be a device named ttyACMXXXX where the XXXX is specific to the user's computer. The ttyACMXXXX device can be used to operate the valve. See "Code Examples" for an example of how to write a simple program to control the valve through the serial interface.

Serial Command List

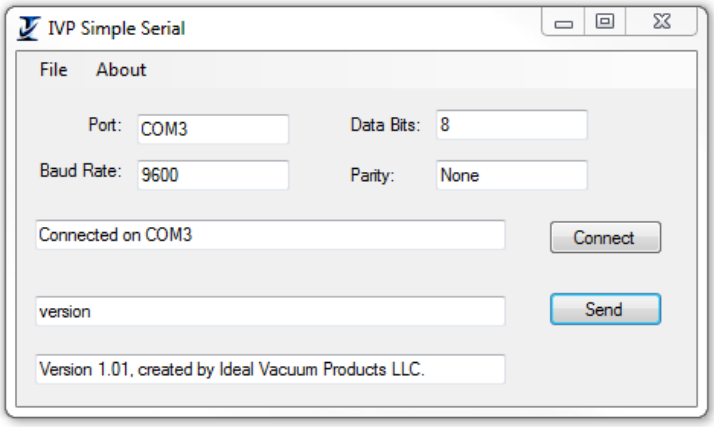
With the CommandValve identified it is now possible to send serial commands. The user can use a serial terminal application or through an application written by the user. The latter option provides for the most control of the valve. The supported serial commands for the CommandValve are listed below:

Command	Description
pos	Returns the angle of the valve between 0° and 90°.
home	Calculate mechanical backlash and zero the valve.
ang xx	Positions the valve at angle xx.
spd xx	Sets the speed of the valve.
rpm	Revolutions per Minute of valve.
open	Fully open the valve (90°).
close	Close the valve (0°).
stop	Stop the valve at its current position.
version	Version of the valve.
pn	Retrieve the part number.
sn	Retrieve the serial number.
after-home xx	Go to angle xx° after a home command.

Code Examples (VB.NET, C, LabVIEW, and Python)

Integrating the CommandValve into a larger system is simple once the CommandValve has been identified by the host computer. Code examples are given for various languages below.

VB.net (Using the Window's API), Sample **IVP Simple Serial** Program




```
1.  Imports System.IO.Ports
2.
3.  Public Class Form1
4.
5.      Private Sub ExitToolStripMenuItem_Click(sender As Object, e As EventArgs) Handles
6.      ExitToolStripMenuItem.Click
7.          Me.Close()
8.      End Sub
9.
10.
11.     Public Sub serialConnect()
12.         ' Use the values that the user inputs from the form. Note: This will vary on
13.           how the buttons are laid out.
14.         SerialPort1.PortName = TextBox1.Text
15.         SerialPort1.BaudRate = TextBox2.Text
16.         SerialPort1.DataBits = TextBox5.Text
17.
18.         SerialPort1.Open()
19.
20.     End Sub
21.
22.     Private Sub Form1_FormClosing(sender As Object, e As FormClosingEventArgs)
23.         ' Close the serial port when the user closes the form.
24.         SerialPort1.Close()
25.     End Sub
26.
27.     Private Sub Button2_Click(sender As Object, e As EventArgs) Handles Button2.Click
28.         SerialPort1.Write(TextBox3.Text & vbCr)
29.         ' Note: Not all commands return a value. Use a try-catch.
30.         Try
```

```
            TextBox4.Text = SerialPort1.ReadLine
        Catch ex As Exception
            TextBox4.Text = "No Return Value."
        End Try

    End Sub

    Private Sub Button1_Click(sender As Object, e As EventArgs) Handles Button1.Click
        serialConnect()
        TextBox7.Text = "Connected on " & TextBox1.Text
    End Sub

    Private Sub AboutToolStripMenuItem_Click(sender As Object, e As EventArgs) Handles Abo
utToolStripMenuItem.Click
        MsgBox("The Simple Serial Terminal from Ideal Vacuum Products. Version 0.0.1")
    End Sub
End Class
```

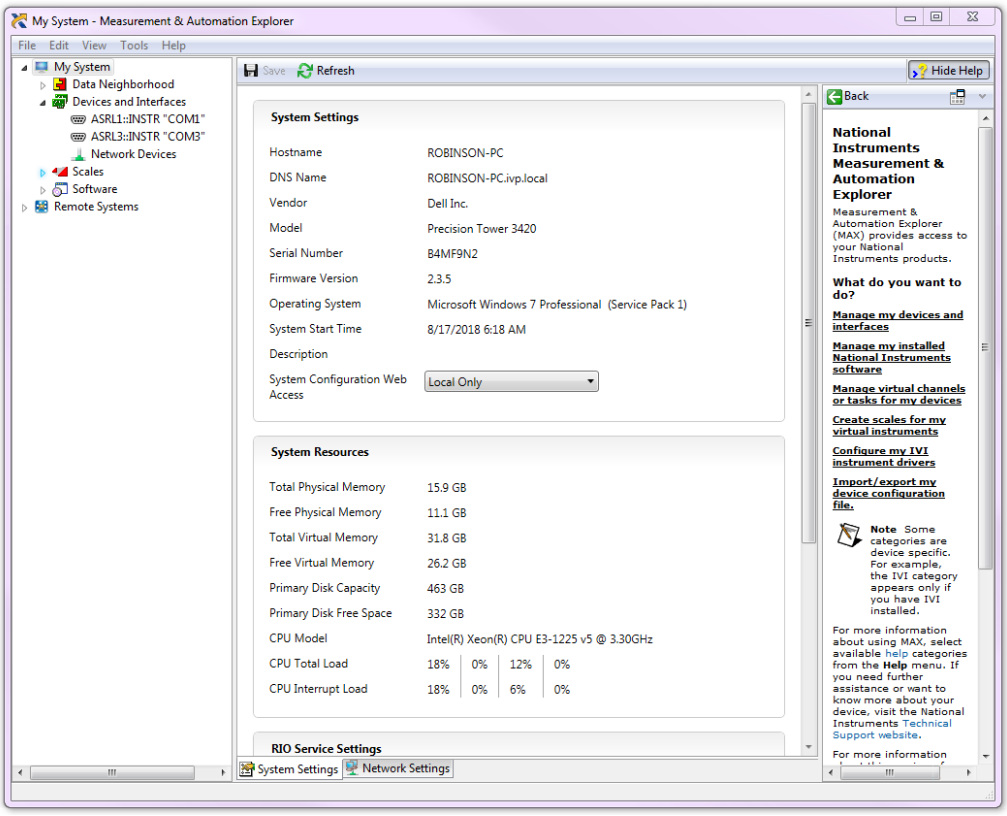
C (Using the Window's API)

```
#include<windows.h>
#include<stdio.h>

// Global variables
char command[20];
int main(void)
{
    HANDLE hComm;
 hComm = CreateFile("COM6",
                GENERIC_READ | GENERIC_WRITE,
                0,
                NULL,
                OPEN_EXISTING,
                0,
                NULL);
    if (hComm == INVALID_HANDLE_VALUE)
    {
        printf("Couldn't Open the port");
    }
    else
    {
        printf("Opened the Port!\n");
    }

    // Set the DCB structure
    DCB dcbSerialParams = {0};
    dcbSerialParams.DCBlength = sizeof(dcbSerialParams);

    dcbSerialParams.BaudRate = 9600;
    dcbSerialParams.ByteSize = 8;
    dcbSerialParams.StopBits = ONESTOPBIT;
    dcbSerialParams.Parity = NOPARITY;

    SetCommState(hComm, &dcbSerialParams);

    printf("Enter a command (0 to exit): ");
    scanf("%[^\n]s", command);

```

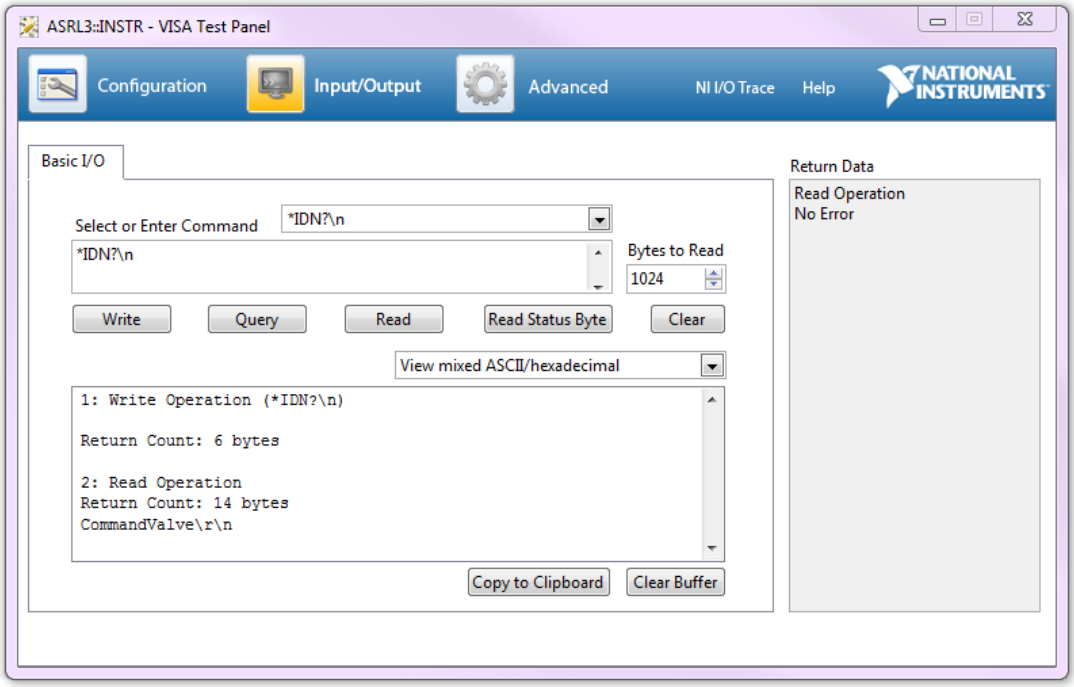
```
39.     DWORD dNoOfBytesToWrite = sizeof(command);
40.     DWORD dNoOfBytesWritten = 0;
41.
42.     WriteFile(hComm,command,dNoOfBytesToWrite,&dNoOfBytesWritten,NULL);
43.
44.     CloseHandle(hComm); // Close the port
45.
46.     return 0;
47. }
```

National Instruments LabVIEW (Using the Window's API)

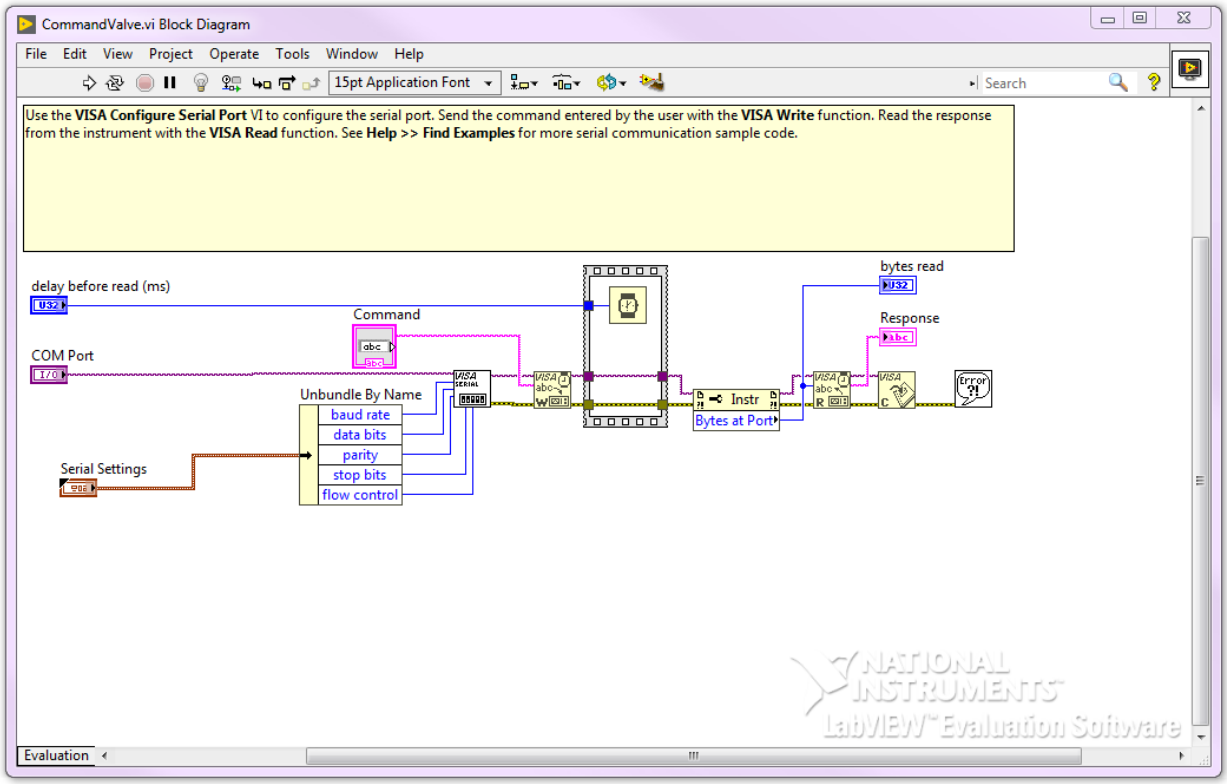
Step 1. To identify the CommandValve with LabView the user must first open **NI MAX** and under **Devices and Interfaces**, select the **COM port** on which the valve is selected.

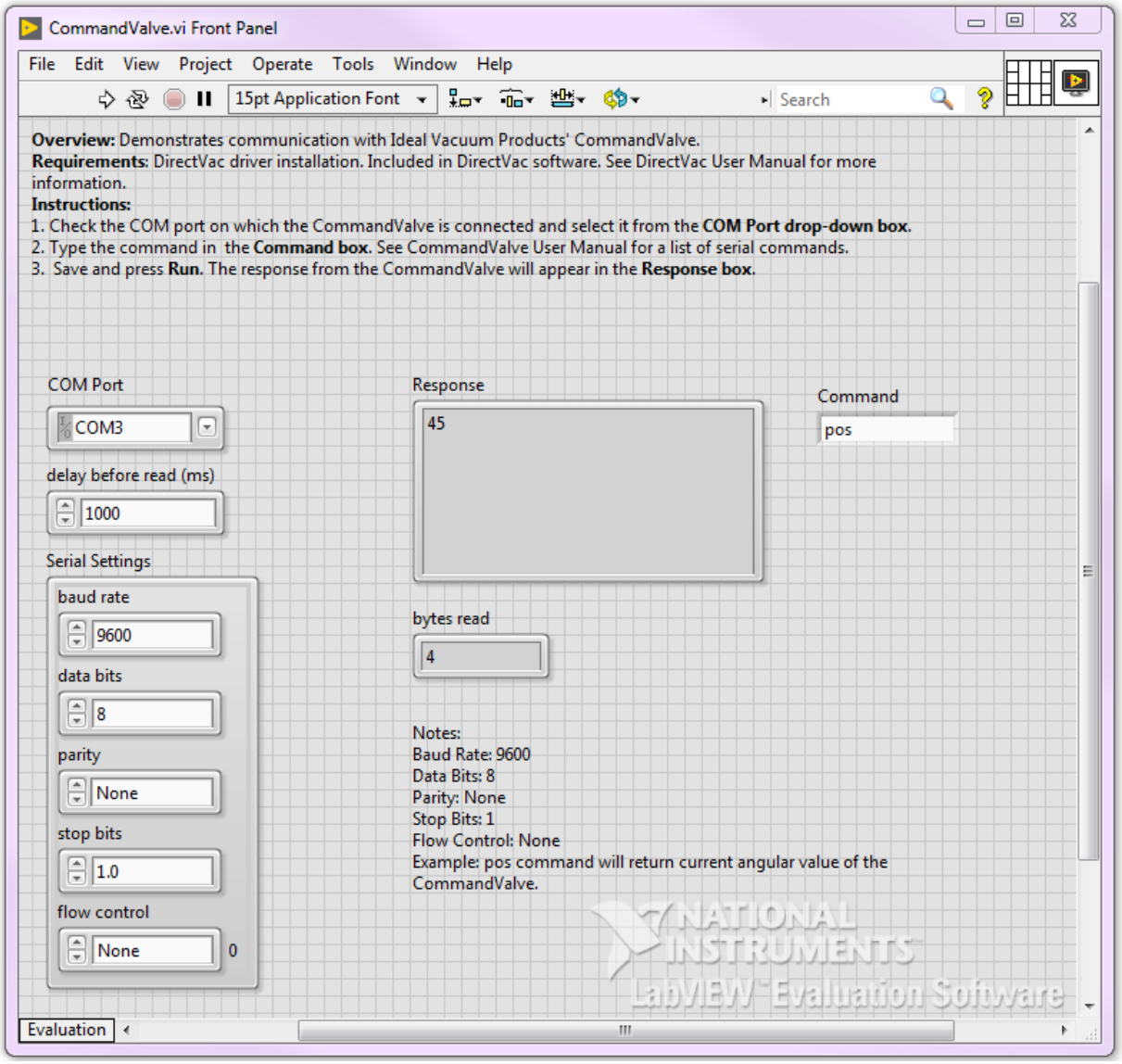


Step 2. With the proper COM port selected, go to the Open VISA Test Panel tab. Select the **Input/Output** button from the ribbon on the top of the window. With ***IDN?\n** as the command press the **Write** button. Then select the **Read** button. If the CommandValve is configured correctly, the **Read** command will return the response **CommandValve\r\n**. This ensures that LabVIEW can communicate with the device.



A sample LabVIEW project is provided to quickly integrate the CommandValve into the user's project.




CommandValve.vi Front Panel
File Edit View Project Operate Tools Window Help
15pt Application Font
Search
Overview: Demonstrates communication with Ideal Vacuum Products' CommandValve.
Requirements: DirectVac driver installation. Included in DirectVac software. See DirectVac User Manual for more information.
Instructions:
1. Check the COM port on which the CommandValve is connected and select it from the COM Port drop-down box.
2. Type the command in the Command box. See CommandValve User Manual for a list of serial commands.
3. Save and press Run. The response from the CommandValve will appear in the Response box.
COM Port
COM3
delay before read (ms)
1000
Serial Settings
baud rate
9600
data bits
8
parity
None
stop bits
1.0
flow control
None
0
Response
45
bytes read
4
Command
pos
Notes:
Baud Rate: 9600
Data Bits: 8
Parity: None
Stop Bits: 1
Flow Control: None
Example: pos command will return current angular value of the CommandValve.
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Python

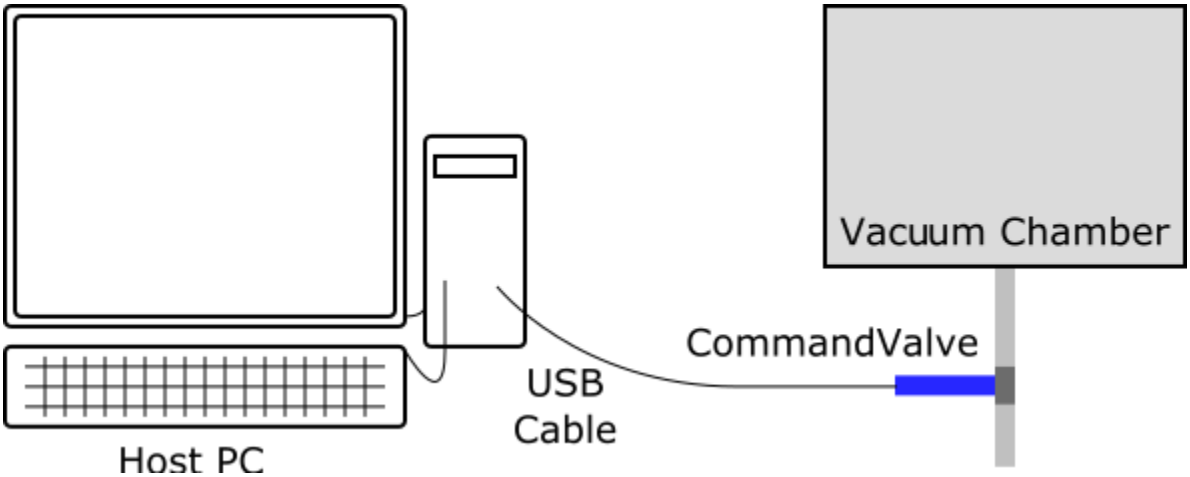
Scripting of the serial commands can be done in Python using the pySerial library. Install the library using **pip install pySerial** in the terminal or command prompt.

```
# Example script to open the valve to a
# random number, home the valve, and
# return the backlash value.

# Import serial for serial communication,
# time for a delay, and random for random
# integer angles.
import serial
import time
import random

# Number of cycles.
CYCLES = 5
DELAY = 3
# Open the serial port on COM6.
ser = serial.Serial('COM6')

# Instantiate a Random() object.
random_angle = random.Random()

for i in range(CYCLES):
    # Generate a random number.
    rand = random_angle.randint(0,90)
    # Create an angle command and send to CommandValve.
    angle = b'ang '+ str(rand).encode()
    ser.write(angle)
    time.sleep(DELAY)

    # Perform a homing sequence.
    ser.write(b'home\n\r')
    time.sleep(DELAY)


    # Get the mechanical backlash and print the results.
    ser.write(b'lash\n\r')
    lash = ser.readline().decode().strip()
    print("sample: {} ang: {} lash: {}".format(i,rand,lash))

# Close the serial port.
ser.close()
```

Networking

Although the CommandValve is not direct network enabled, it can be used with a networked computer to be controlled remotely. That is, the **Remote PC** can be connected to a **Host PC** (PC which the valve is mounted) via an internet network. The **Remote PC** sends control messages to the **Host PC** which forwards the messages to the CommandValve.

Commands can be issued to the CommandValve from a host computer (see a simplified schematic of how the CommandValve is connected below). For specific connection details, follow the instructions given in the Command Valve Installation section above.



To add additional network capabilities, we recommend a USB to IP Hub like the example show above. A 4-Port Hub could be used to control up to 4 CommandValves directly over the internal network.

Troubleshooting

CommandValve Does Not Respond Upon Start-Up

When power is supplied to the CommandValve, the valve should perform a homing sequence. If the valve does not respond when power is applied, check all connections. Ensure that the power supply is receiving adequate power.

If the LED indicator is blinking red, the motor is disconnected from the controller. Contact Ideal Vacuum Products support for further guidance.

If the LED indicator is blinking orange, the motor is in a stall condition. Contact Ideal Vacuum Products support for further guidance.

CommandValve Not Recognized When Connected to Host PC

If the CommandValve is not recognized when connected by USB to the Host PC ensure that the connections are secure and the valve is powered on. Further, if using Windows OS, run the included Windows install wizard included on the USB drive as explained in the Remote Operation section.

Service

Ideal Vacuum can service your CommandValve and rebuild it back to like new condition, our rebuild service is cost effective, typically set at half the cost of a new valve. To send in your CommandValve for service please fill out our online RMA form at:

https://www.idealvac.com/RMA_Rebuild_Service_Form.asp

Shipping instructions along with the RMA number will be printable after the website RMA form is been submitted. Please visit www.idealvac.com or call us at (505) 872-0037, if you have other questions. Thank you for your business!

Manufacturing Details

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Our Products Develop Tomorrow's Technologies!