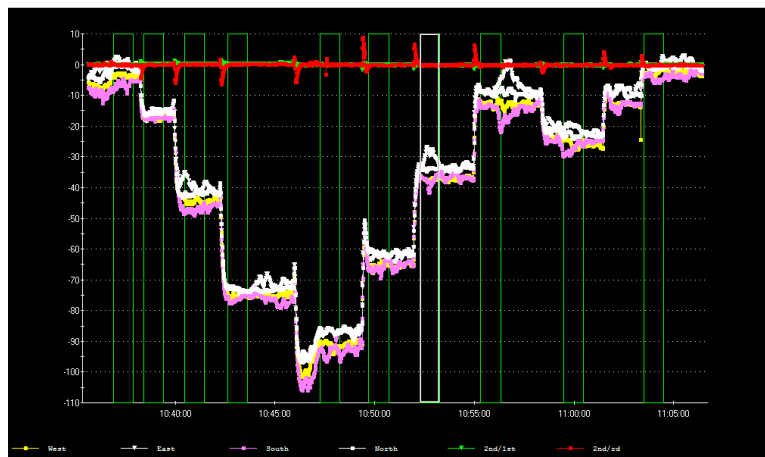
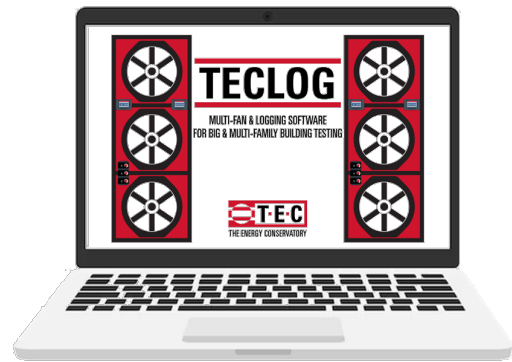
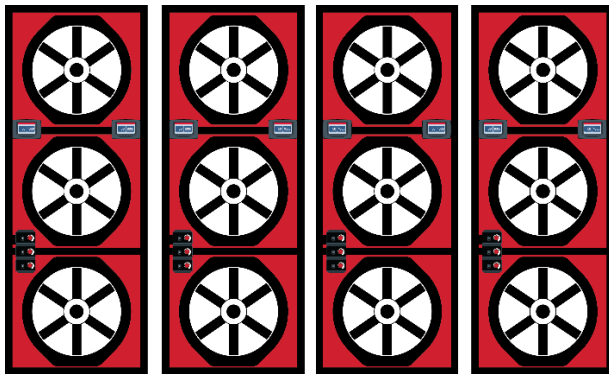




# Whole Building Airtightness Testing Reference Material



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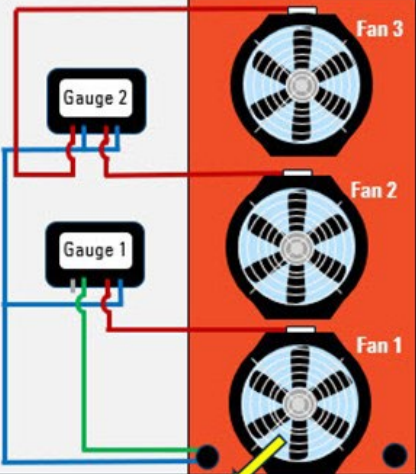
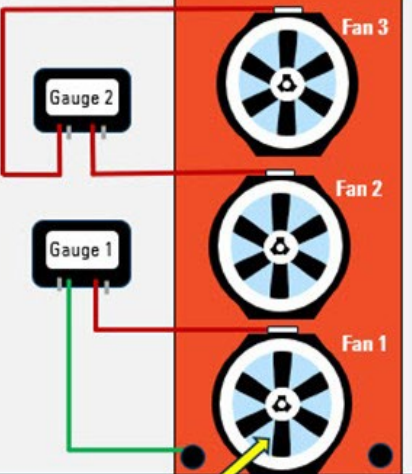
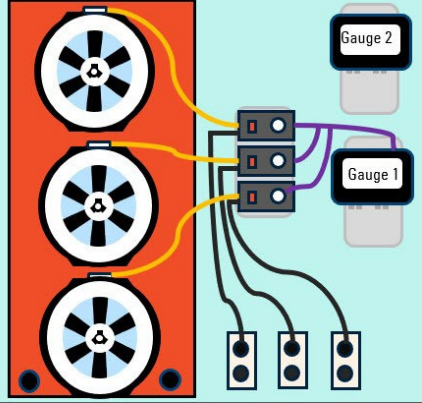













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<b>TECLOG Overview .....</b>	<b>5</b>
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<b>Planning, Preparing and Performing Tests .....</b>	<b>19</b>

# Setting up Fans, Tubing, Wiring and TECLOG


## 3 Fan System with 2 Gauges, Single Zone Building

### Testing from INSIDE

	<h2>INSIDE SETUP</h2> <p>3 Fan/2 Gauge System, Single Zone Building</p>	<p><b>Equipment List</b></p> <ul style="list-style-type: none"> <li>• Model 3 Fan – 3x</li> <li>• DG1000 Gauge – 2x</li> <li>• Gauge Mounting Board – 2x</li> <li>• Speed Controller Mounting Board</li> <li>• Commercial Frame</li> <li>• 3-hole Panel</li> <li>• 3-fan Control Cable</li> </ul>								
<p><b>1. Install Fans &amp; Setup Tubing Based on Gauge Location &amp; Fan Direction</b></p>		<p><b>2. Power Fans &amp; Setup Fan Control</b></p>								
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Pressurization Test</p>  </div> <div style="text-align: center;"> <p>Depressurization Test</p>  </div> </div> <p style="text-align: center;">Air Flow</p> <p style="text-align: center;">Green = Envelope Pressure Red = Fan Pressure Blue = Fan Reference Pressure</p>		 <ul style="list-style-type: none"> <li>• Each fan requires a separate 15A circuit.</li> <li>• The 3-fan control cable allows one gauge to control all 3 fans. Fan speed control is independent of the tubing.</li> </ul>								
<p><b>3. Setup Gauge Network</b></p> <ul style="list-style-type: none"> <li>• Establish a network to connected gauges and computer w/TECLOG</li> <li>• Connect via WiFi, USB, Ethernet, Ethernet Bridge Mode (WiFi &amp; Ethernet).</li> <li>• Use QR Code “DG-1000 Networking” for setup details on each networking option.</li> </ul> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>Ethernet <input type="checkbox"/></p> <p>Create WiFi <input type="checkbox"/></p> <p>Join WiFi <input type="checkbox"/></p> <p>USB <input type="checkbox"/></p> </div>	<p><b>4. Configure TECLOG</b></p> <ul style="list-style-type: none"> <li>• See Back</li> </ul> 	<p><b>Related Resources</b></p> <table border="0"> <tr> <td>Multi Fan Testing</td> <td>DG-1000 Networking</td> <td>TEC Tech Support</td> <td>TEC Store</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Multi Fan Testing	DG-1000 Networking	TEC Tech Support	TEC Store				
Multi Fan Testing	DG-1000 Networking	TEC Tech Support	TEC Store							
										

# 3 Fan System with 2 Gauges, Single Zone Building

## Testing from OUTSIDE



### OUTSIDE SETUP

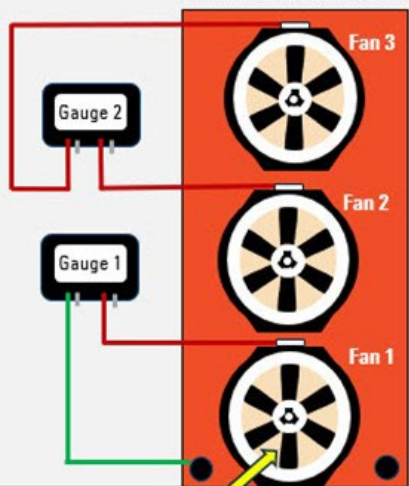
3 Fan/2 Gauge System, Single Zone Building

**Equipment List**

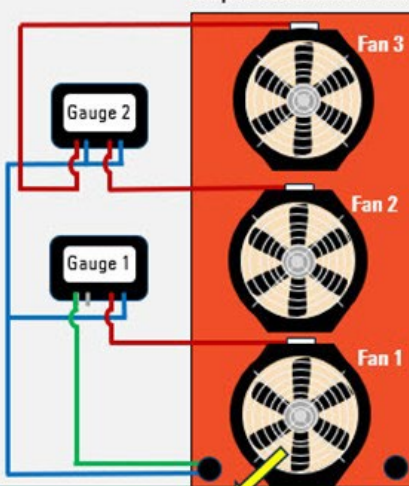
- Model 3 Fan – 3x
- DG1000 Gauge – 2x
- Gauge Mounting Board – 2x
- Speed Controller Mounting Board
- Commercial Frame
- 3-hole Panel
- 3-fan Control Cable

**1. Install Fans & Setup Tubing Based on Gauge Location & Fan Direction**

Pressurization Test

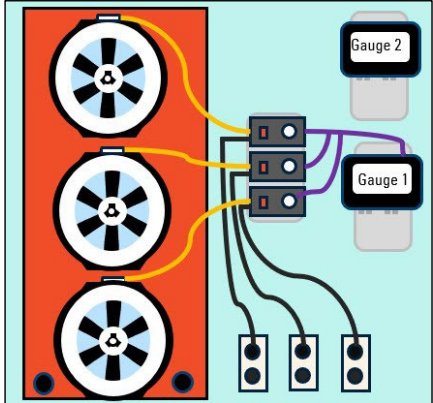


Depressurization Test



Green = Envelope Pressure  
Red = Fan Pressure  
Blue = Fan Reference Pressure

**2. Power Fans & Setup Fan Control**



- Each fan requires a separate 15A circuit.
- The 3-fan control cable allows one gauge to control all 3 fans. Fan speed control is independent of the tubing.


**3. Setup Gauge Network**

- Establish a network to connected gauges and computer w/TECLOG
- Connect via WiFi, USB, Ethernet, Ethernet Bridge Mode (WiFi & Ethernet).
- Use QR Code “DG-1000 Networking” for setup details on each networking option.

Ethernet	<input type="checkbox"/>
Create WiFi	<input type="checkbox"/>
Join WiFi	<input type="checkbox"/>
USB	<input type="checkbox"/>


**4. Configure TECLOG**

- See Back




**Related Resources**


Multi Fan Testing




DG-1000 Networking



TEC Tech Support



TEC Store



# TECLOG Overview



## 4. Configure Test in TECLOG

TECLOG Overview Video



### 1. Connect Gauges to TECLOG

1. Turn on DG-1000 gauges and in the Settings menu under Auto Off and Auto Sleep set them to Never.
2. Launch TECLOG 4 software.
3. In TECLOG 4 hit the Configuration drop down and select Settings and hit the Scan for Ports and Devices button.
4. The software will display all gauges connected to the network with the computer.

### 2. Set-up Gauge Device Labels, Link to Master

1. To setup each gauge start by selecting the check box on the left in the Device Settings window.
2. Then double click in the Serial # field and select a gauge this will automatically fill in the Device Type field.
3. Next fill in the Device Label field. (this label helps identify the gauge during the test).
4. Lastly, select the link check box if you want any fans connected to that gauge to be added to the Master Controller during the test (this allows multiple 3 fan systems to be operated as one).
5. Repeat steps 5-8 on a new line in the Device Settings window for each gauge.

### 3. Assign each channel measurement

1. Identify what each channel of each gauge is measuring (envelope, fan pressure, etc.).
2. Click the View and Edit Channel Settings to open window where each gauge has a tab.
3. Based on the tubing setup from Step 1 of the guide fill in the Label and Channel Type fields.
  - **Envelope Pressures:** building pressure/s with ref to outside (DG-1000 CH A). Multiple channels averaged.
  - **Model 3 Fan Flow:** Uses fan pressure/ring to calculate flow. Channels are summed TECLOG for total flow.
  - **Interior Pressure:** Pressure between 2 areas inside building (to measure pressure uniformity during a test).
  - **Pressure:** Generic measurement of any pressure you want to record during a test.
4. Repeat steps 2 & 3 for all gauges.
5. Click Ok again to close the channel settings window.
6. Additional channel controls on Channel Settings window detailed in TECLOG 4 video, time stamp 10:47.

### 4. Select Test Standard

1. Select Test Standard from the Air Tightness Settings to follow aspects of the standard, includes report of results.
2. Hit Ok to close the Configuration Settings window

Step 2 Device Settings Window

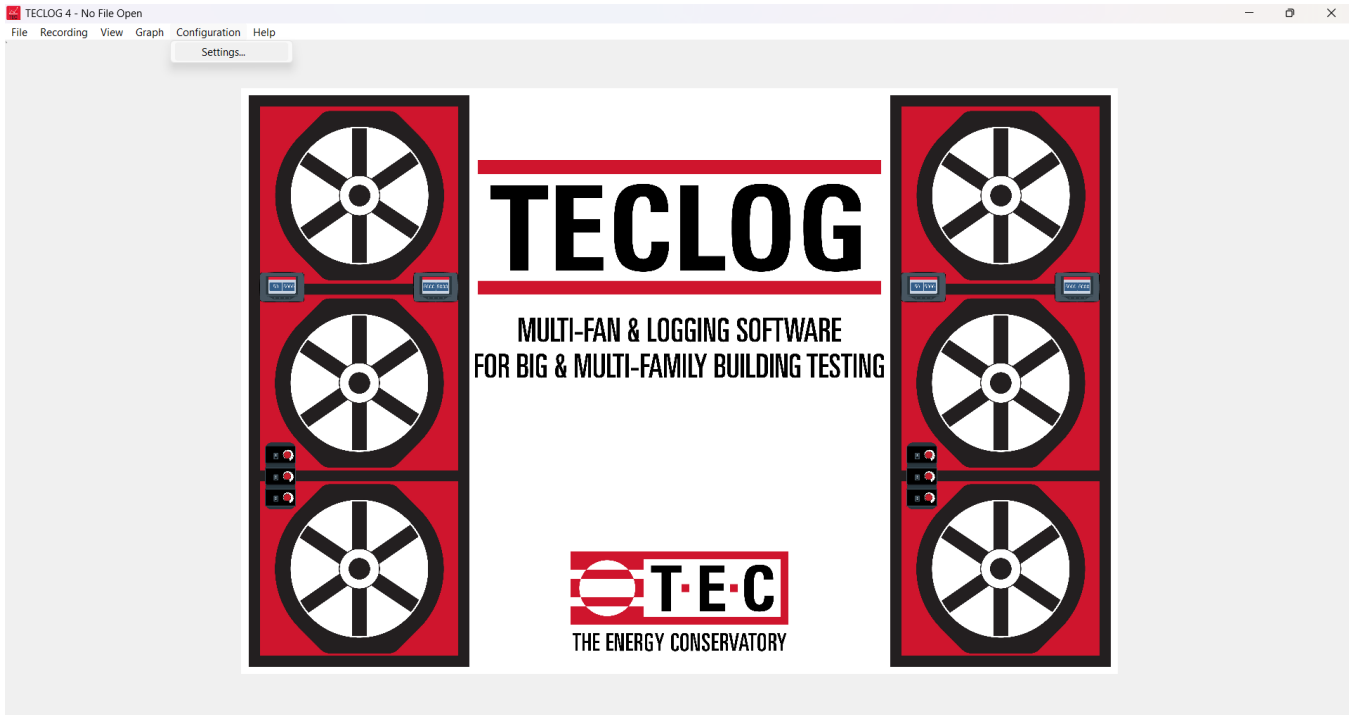
Device Settings			
Device Type	Serial #	Device Label	link
<input checked="" type="checkbox"/>	DG1000	3130	upper <input checked="" type="checkbox"/>

Step 3 Channel Settings Window

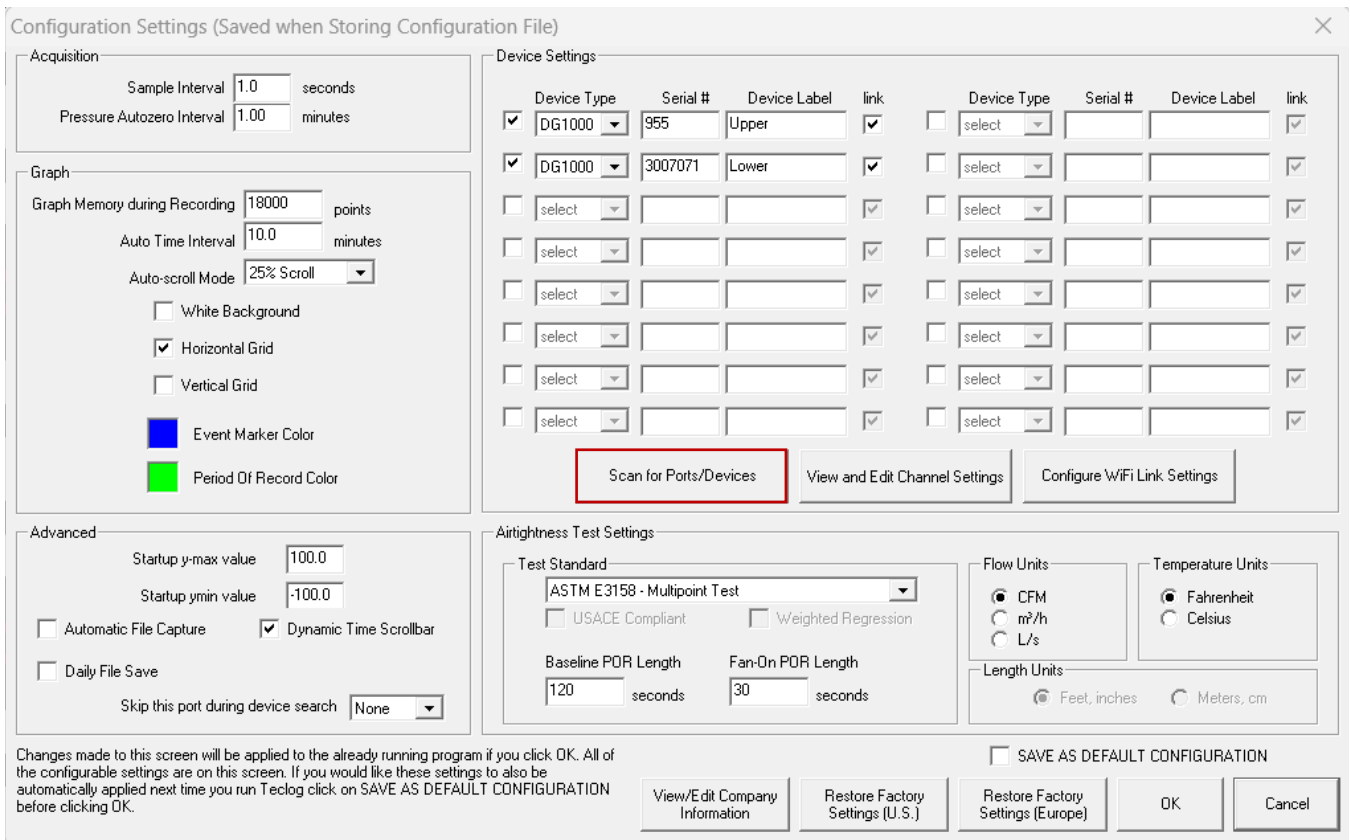
Channel Settings									
3130	13282	3022425	12126						
DG1000-3130 upper									
Color	Label	On	Channel Type	Device SN	Cal Date	# Dec	Calibration	Plot Format	Plot Style
A	Envelope	<input checked="" type="checkbox"/>	Envelope Pressure			1	settings	Symbol and Line	style
B	Bottom Fan	<input checked="" type="checkbox"/>	Model 3 Fan Flow			0	settings	Symbol and Line	style

# TECLOG 4 SCREEN REVIEW for Step 4: CONFIGURATE TECLOG

## Step 1. From Home Screen, Select Configuration/Settings



## Step 2: In Configuration Settings, Hit “Scan for Ports/Devices”



## Step 2: Scan for Ports/Devices

Configuration Settings (Saved when Storing Configuration File)

**Acquisition**

Sample Interval: 1.0 seconds  
Pressure Autozero Interval: 1.00 minutes

**Graph**

Graph Memory during Recording: 18000 points  
Auto Time Interval: 10.0 minutes  
Auto-scroll Mode: 25% Scroll

White Background  
 Horizontal Grid  
 Vertical Grid

Event Marker Color  
 Period Of Record Color

**Advanced**

Startup y-max value: 100.0  
Startup ymin value: -100.0

Automatic File Capture  Dynamic Time Scroll  
 Daily File Save

Skip this port during device search: None

**Device Settings**

Device Type	Serial #	Device Label	link
select			<input checked="" type="checkbox"/>
select			<input checked="" type="checkbox"/>
select			<input checked="" type="checkbox"/>
select			<input checked="" type="checkbox"/>
select			<input checked="" type="checkbox"/>
select			<input checked="" type="checkbox"/>
select			<input checked="" type="checkbox"/>
select			<input checked="" type="checkbox"/>

Flow Units:  CFM  m<sup>3</sup>/h  L/s  
Temperature Units:  Fahrenheit  Celsius  
Length Units:  Feet, inches  Meters, cm

SAVE AS DEFAULT CONFIGURATION

View/Edit Company Information | Restore Factory Settings (U.S.) | Restore Factory Settings (Europe) | OK | Cancel

Changes made to this screen will be applied to the already running program if you click OK. All of the configurable settings are on this screen. If you would like these settings to also be automatically applied next time you run Teclog click on SAVE AS DEFAULT CONFIGURATION before clicking OK.

**Comm Port Test**

Results:

Scanning computer networks for TEC devices...

172.16.2.3: Digital Gauge Located. Serial Number DG1000 - 3130  
172.16.2.1: Digital Gauge Located. Serial Number DG1000 - 13281  
172.16.2.4: Digital Gauge Located. Serial Number DG1000 - 955

-----  
3 Energy Conservatory APTs or Digital Gauges detected.

OK | Stop Test

## Step 3: Complete Device Type, Serial #, Device Label, Link

Configuration Settings (Saved when Storing Configuration File)

**Acquisition**

Sample Interval: 1.0 seconds  
Pressure Autozero Interval: 1.00 minutes

**Graph**

Graph Memory during Recording: 18000 points  
Auto Time Interval: 10.0 minutes  
Auto-scroll Mode: 25% Scroll

White Background  
 Horizontal Grid  
 Vertical Grid

Event Marker Color  
 Period Of Record Color

**Advanced**

Startup y-max value: 100.0  
Startup ymin value: -100.0

Automatic File Capture  Dynamic Time Scrollbar  
 Daily File Save

Skip this port during device search: None

**Device Settings**

Device Type	Serial #	Device Label	link
<input checked="" type="checkbox"/> DG1000	13281	Main BD	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> DG1000	3130	Pressure	<input type="checkbox"/>
<input checked="" type="checkbox"/> DG1000	955	Pressure	<input type="checkbox"/>
<input type="checkbox"/> select			<input checked="" type="checkbox"/>
<input type="checkbox"/> select			<input checked="" type="checkbox"/>
<input type="checkbox"/> select			<input checked="" type="checkbox"/>
<input type="checkbox"/> select			<input checked="" type="checkbox"/>
<input type="checkbox"/> select			<input checked="" type="checkbox"/>
<input type="checkbox"/> select			<input checked="" type="checkbox"/>

Scan for Ports/Devices | View and Edit Channel Settings | Configure WiFi Link Settings

**Airtightness Test Settings**

Test Standard: ASTM E3158 - Multipoint Test  
 USACE Compliant  Weighted Regression

Baseline PDR Length: 120 seconds | Fan-On PDR Length: 30 seconds

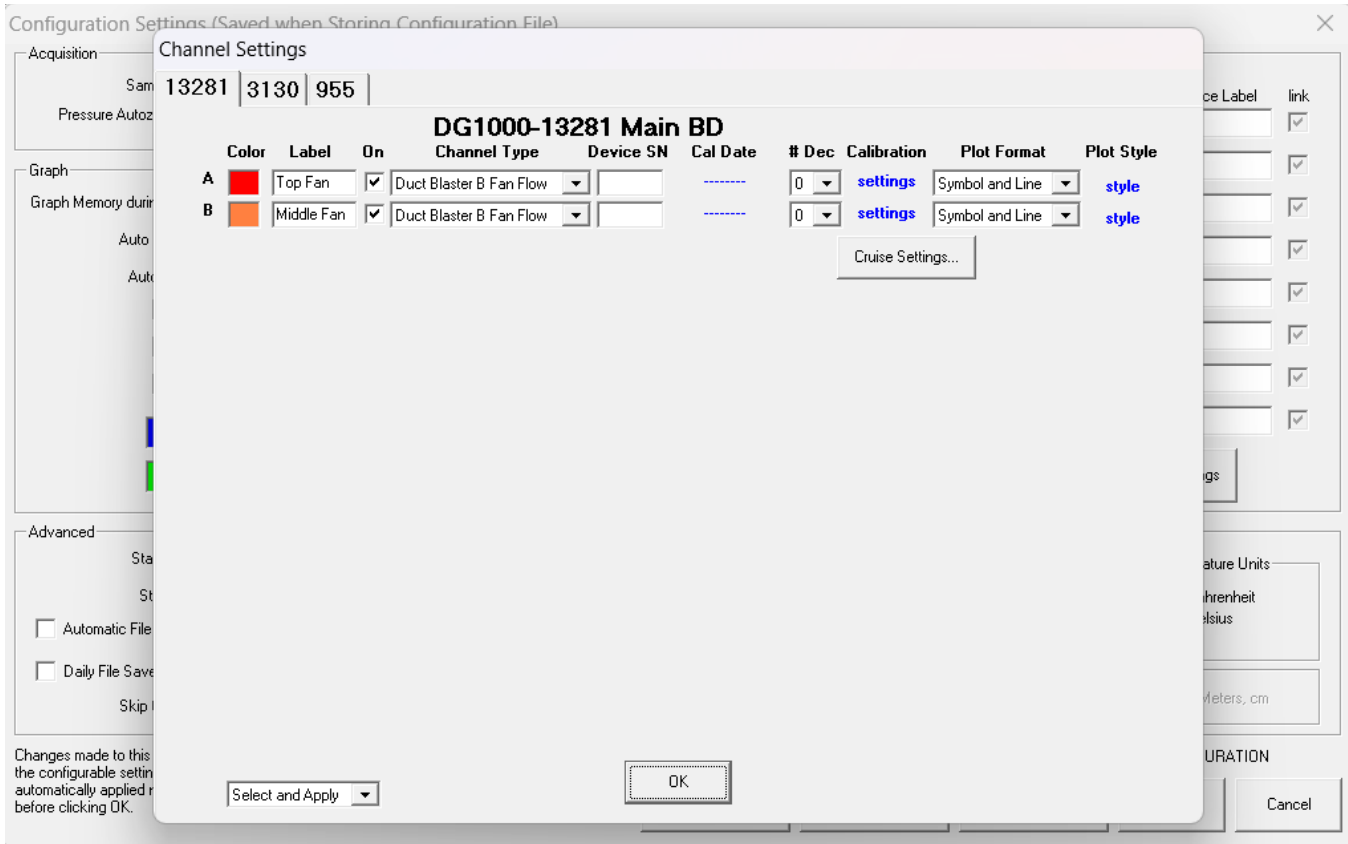
Flow Units:  CFM  m<sup>3</sup>/h  L/s  
Temperature Units:  Fahrenheit  Celsius  
Length Units:  Feet, inches  Meters, cm

SAVE AS DEFAULT CONFIGURATION

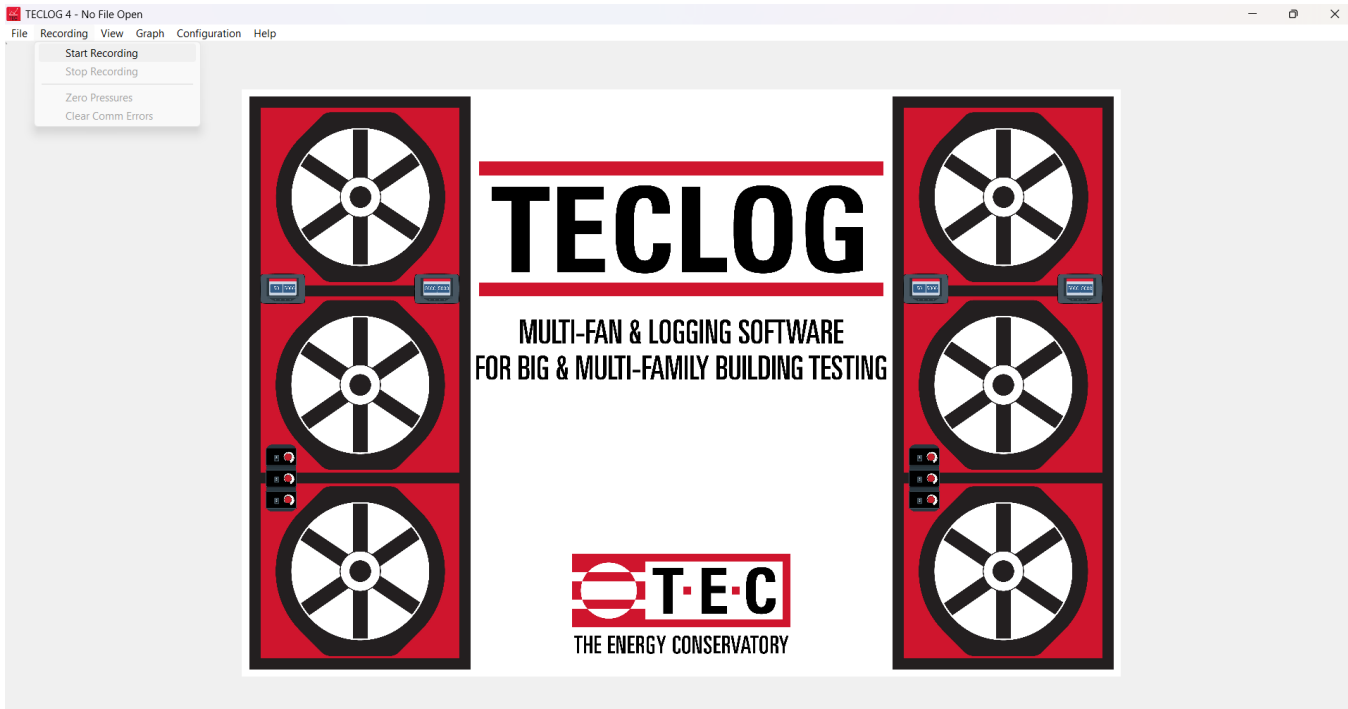
View/Edit Company Information | Restore Factory Settings (U.S.) | Restore Factory Settings (Europe) | OK | Cancel

Changes made to this screen will be applied to the already running program if you click OK. All of the configurable settings are on this screen. If you would like these settings to also be automatically applied next time you run Teclog click on SAVE AS DEFAULT CONFIGURATION before clicking OK.

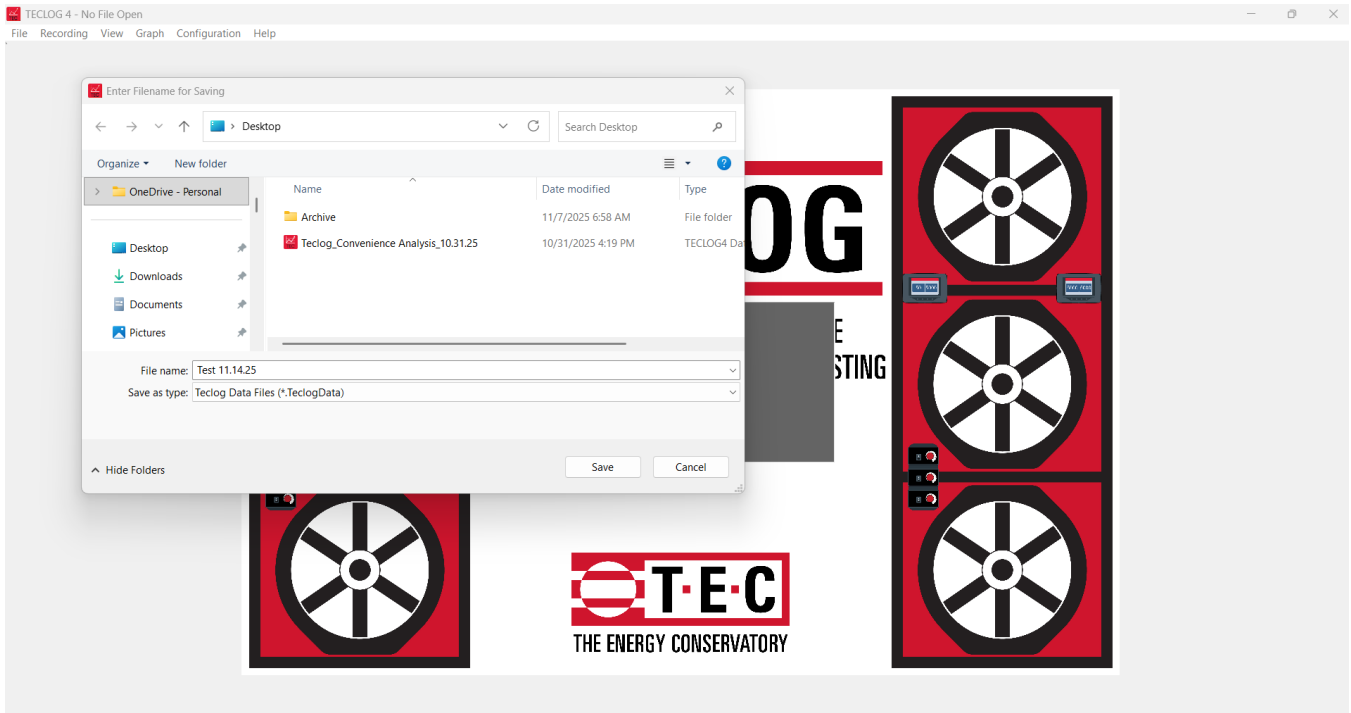
## Step 4: View & Edit Channel Settings



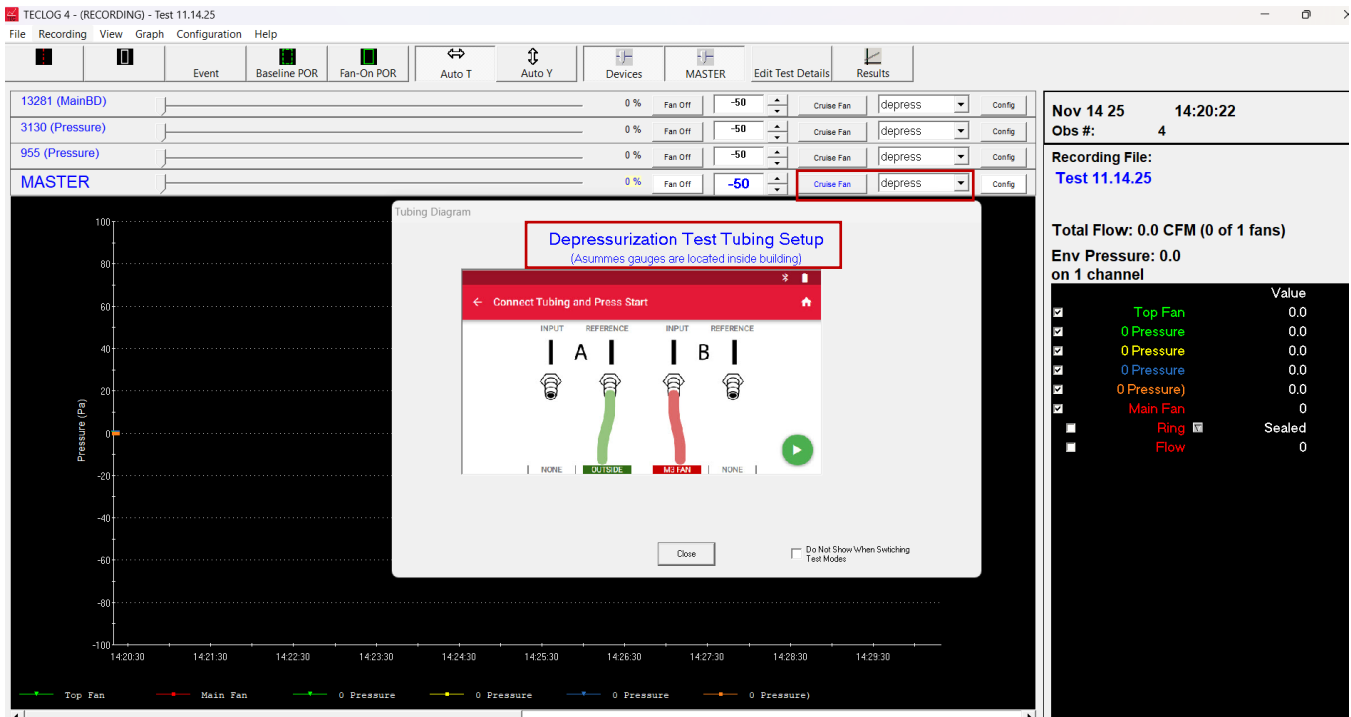
## Step 5: Start Recording



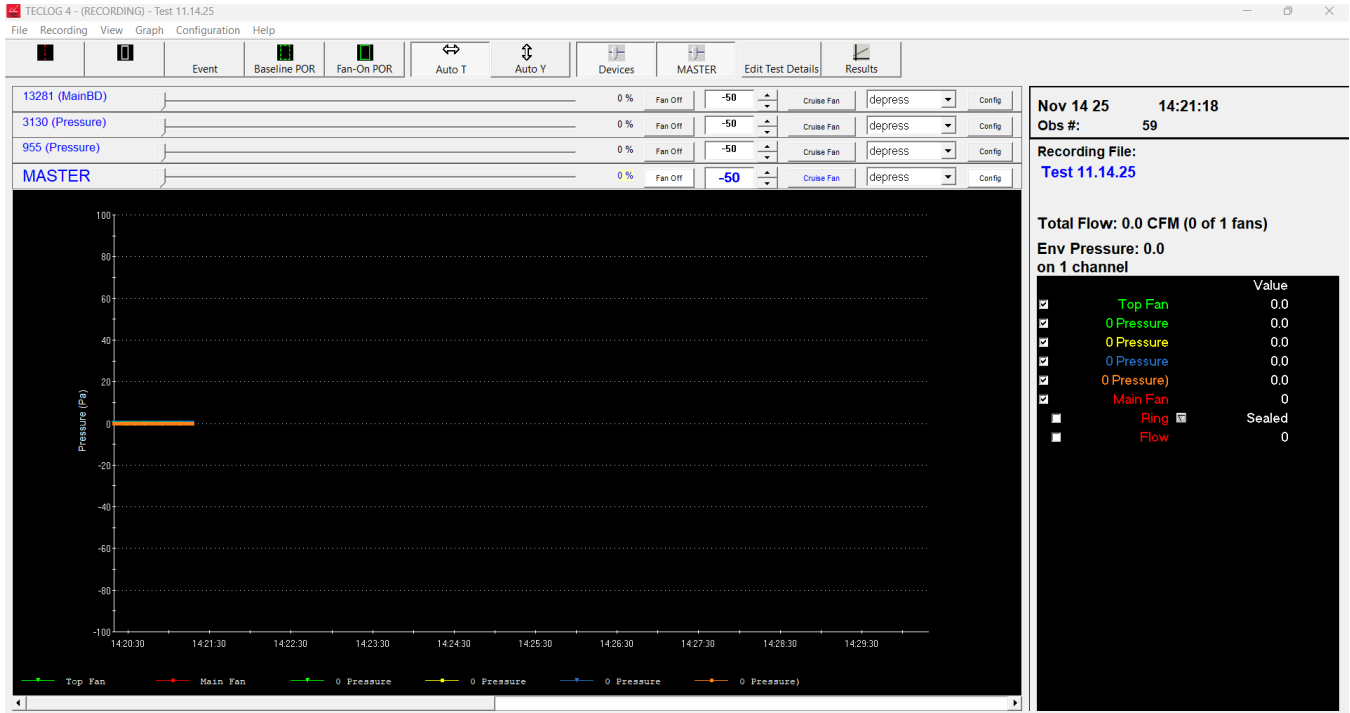
## Step 5: Start Recording, Name File



## Step 6: Confirm Tubing Set-up on Fans per Guide



# Step 7: Begin Test

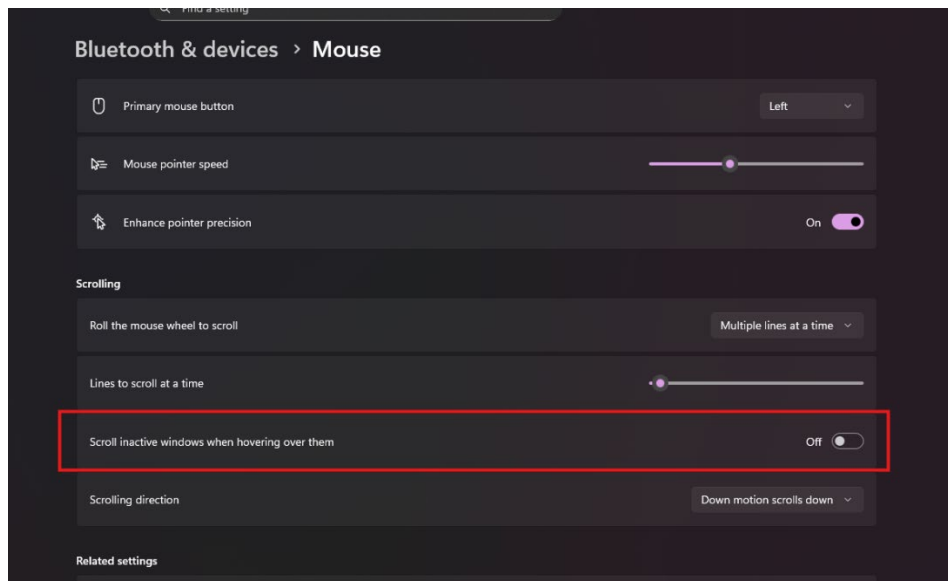


## TECLOG Hot Keys

- B: Create a baseline POR with the default POR length starting at the current point
- F: Create a fan-on POR with the default POR length starting at the current point
- M: add event marker
- S: Toggle scan rate indicator
- Z: autozero all devices
- ← / → :
- If time measurement line tool active, move marker left or right
- If region select tool active, move region
  - + CTRL: move left index
  - + ALT: move right index
- ESC: Shut off all fans (if recording data)
- CTRL + C: copy chart to clipboard
- F1: Show help
- Press and Hold Left Mouse Button: drag graph

### To enable zoom with mouse wheel:

Turn off “Scroll inactive windows when hovering over them” in Mouse scrolling settings (Windows 10/11)





THE ENERGY CONSERVATORY

# DG-1000 QUICK GUIDE: Computer Networking Examples




# DG-1000 Pressure and Flow Gauge Networking Examples

## TEC Example 1

Single Fan System (1 DG-1000 Gauge to Computer via Wi-Fi wireless communication)

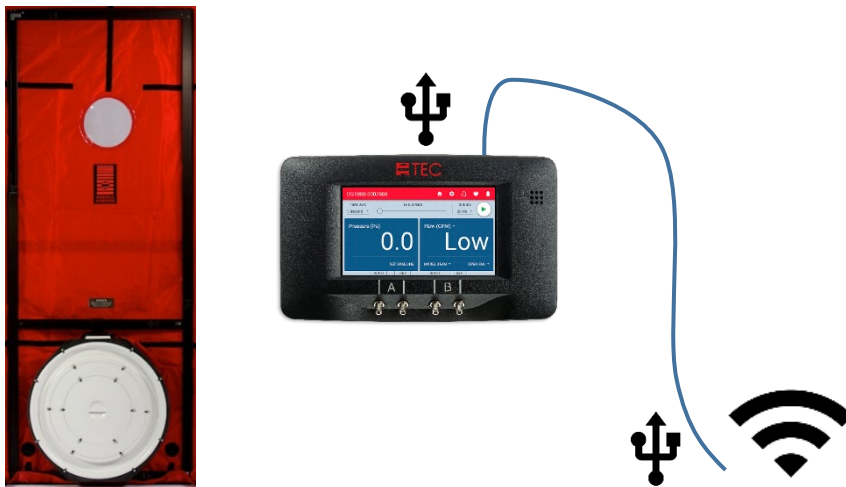


### Wireless Connections

- 1 DG-1000 gauge with the network configuration set to **Create Network** .
- The laptop computer is joined to the wireless network being broadcast by the DG-1000 gauge.

## TEC Example 2

Single Fan System (1 DG-1000 Gauge to computer via wired USB communication)



### Wired Connections



- 1 DG-1000 with the network configuration set to **USB** .
- The laptop computer is connected to the DG-1000 gauge using a micro USB/standard USB cable.
- You will need to download and install the appropriate USB driver to your laptop computer in order to use the **USB** networking option. Drivers are installed on the laptop using the Windows Update service.

### TEC Example 3

#### Single 3 Fan System (2 DG-1000 Gauges – wireless communication)

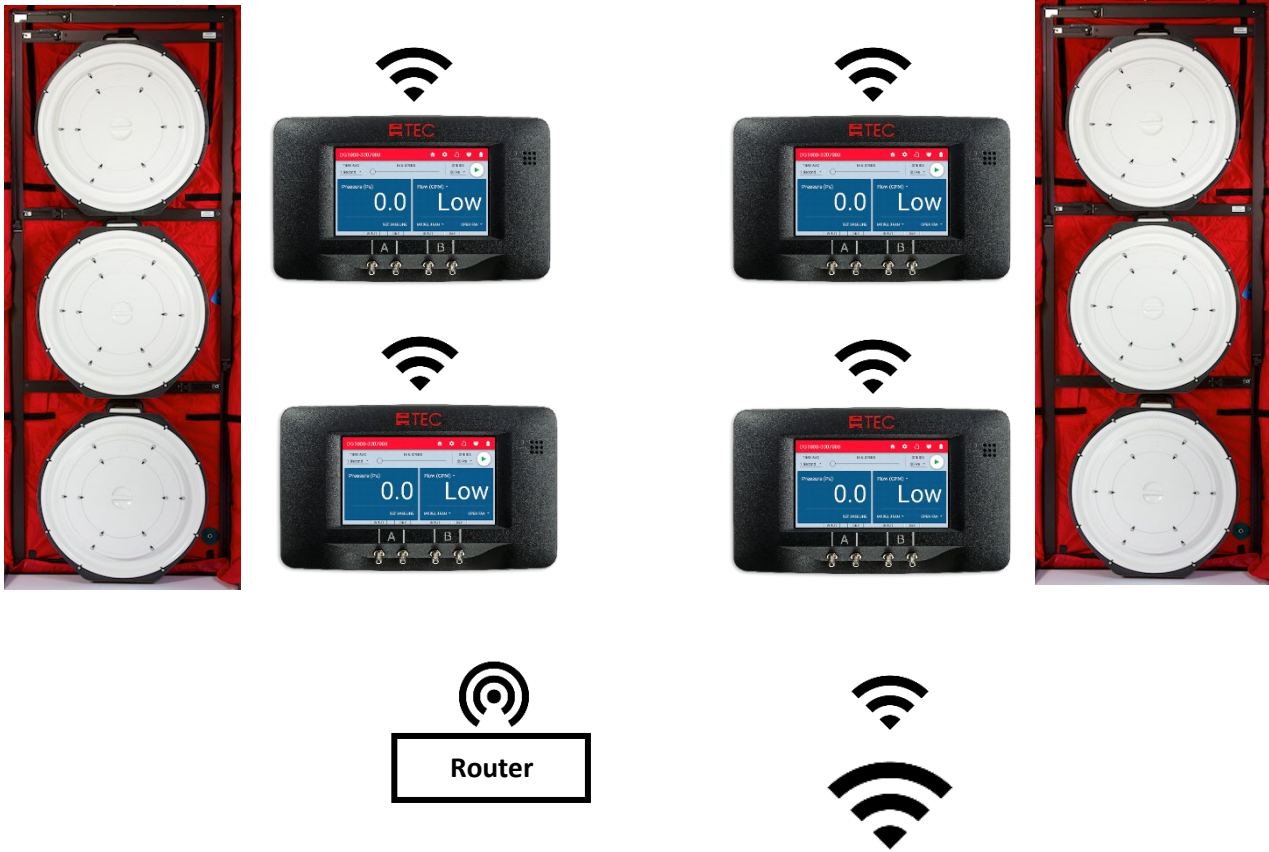


#### Wireless Connections


- 1 DG-1000 gauge in the 3 Fan System with the network configuration set to **Create Network** 
- 1 DG-1000 gauge in the 3 Fan System with the network configuration set to **Join Network** 
- Both the laptop computer and the DG-1000 gauge set to **Join Network** are joined to the wireless network being broadcast by the DG-1000 gauge set to **Create Network**.
  
- Note: If using DG-1000 firmware version 1.8.0 (137) or later, no password entry is required to connect DG-1000's to networks created by another DG-1000.

## TEC Example 4

### Multiple 3 Fan System (4 DG-1000 Gauges – wireless communication)

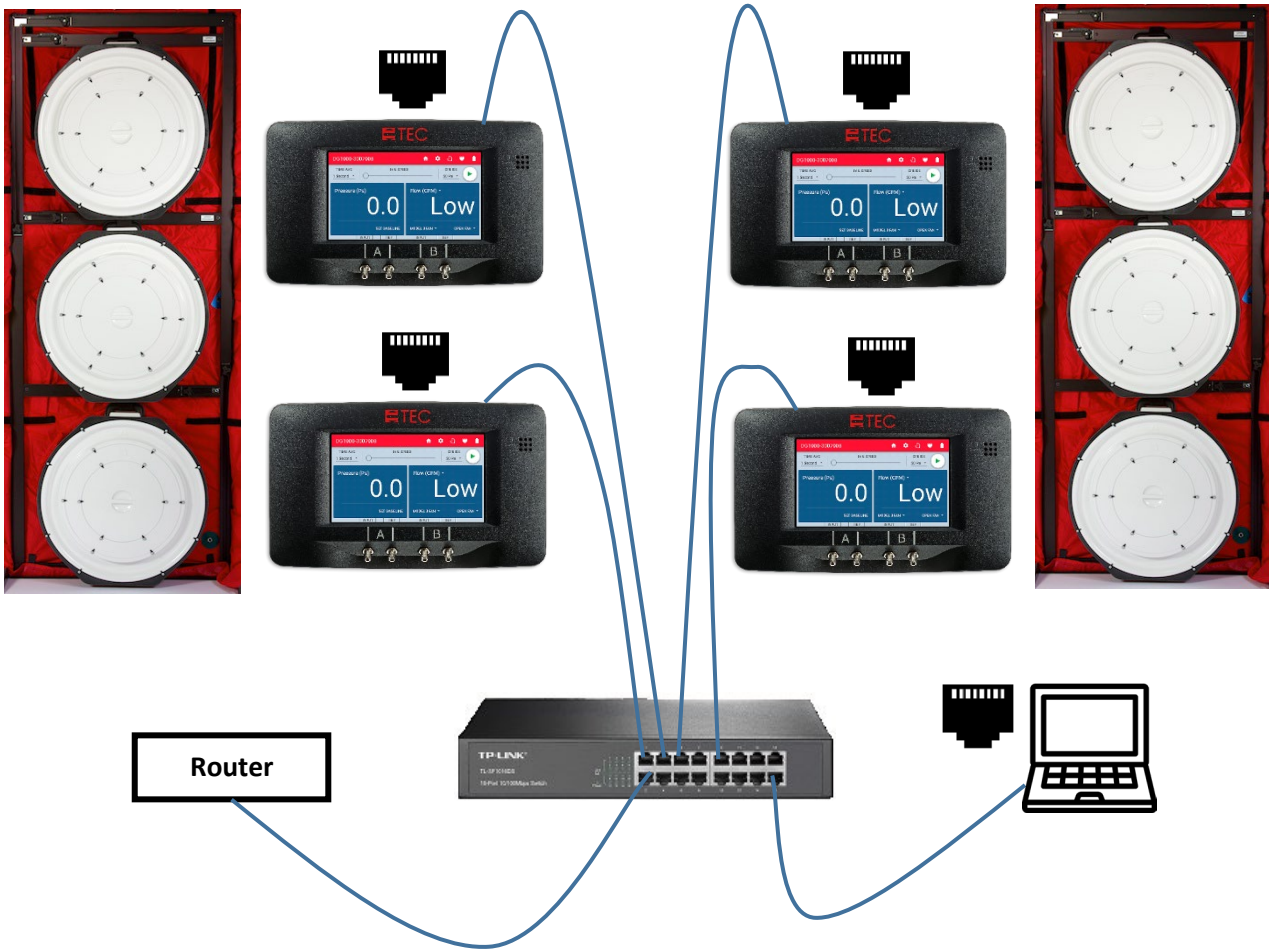


#### Wireless Connections


- All 4 DG-1000 gauges with the network configuration set to **Join Network** 
- The 4 gauges are joined to the wireless network being broadcast by the router.
- The laptop computer is also joined to the wireless network being broadcast by the router.
- This setup can be expanded for additional Blower Door systems and DG-1000 gauges.

## TEC Example 5

### Multiple 3 Fan System (4 DG-1000 Gauges – wired Ethernet communication)

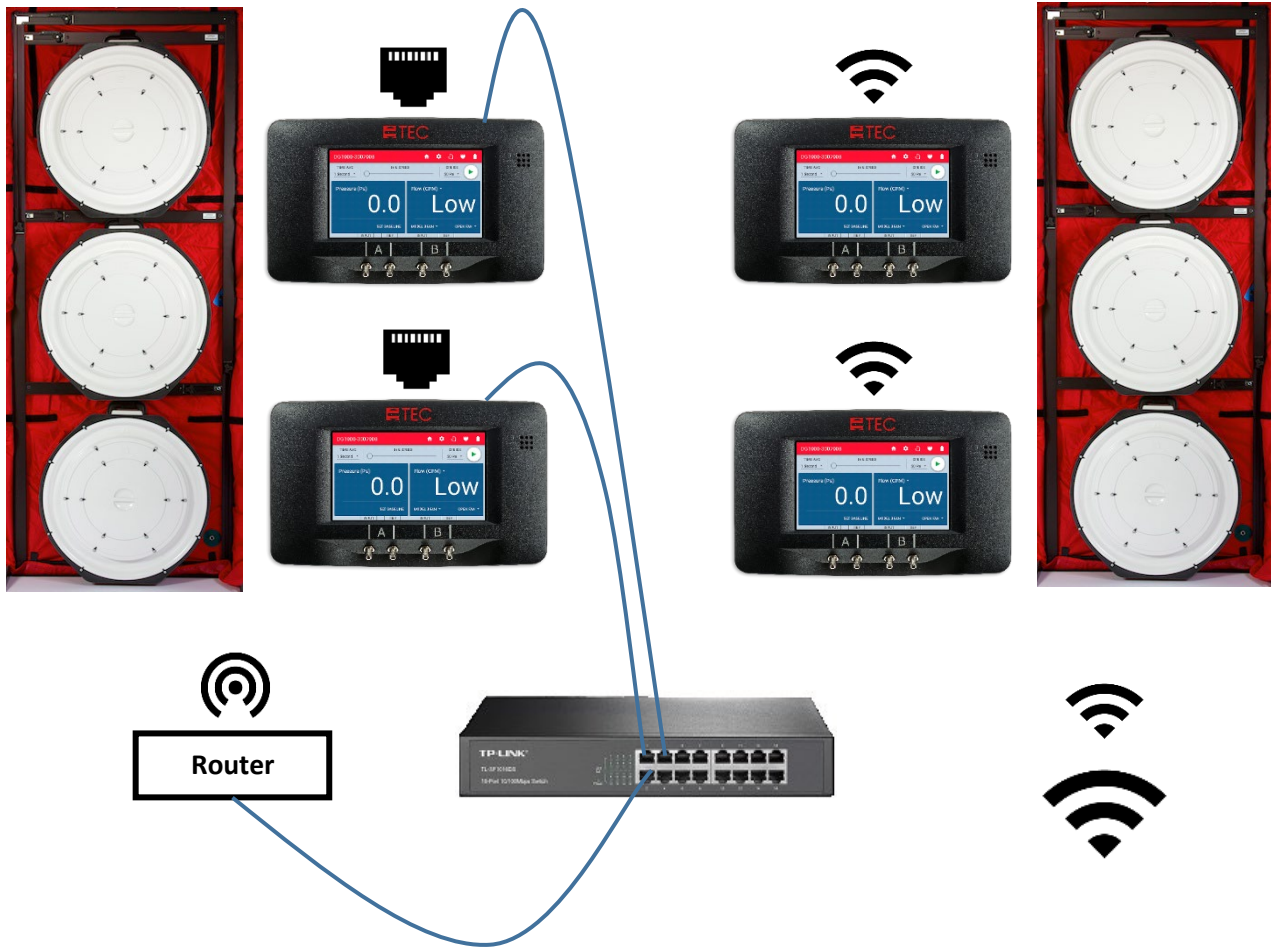


#### Wired Connections


- All 4 DG-1000 gauges with the network configuration set to **Ethernet** .
- The 4 gauges are connected to an Ethernet switch.
- A router and laptop computer are also connected to the Ethernet switch. The router is connected using a LAN port on the router.
- Using the **Ethernet** networking option on the DG-1000 requires that a single device in the network is running DHCP server (this is the reason we have a router connected to the network).
- This setup can be expanded for additional Blower Door systems and DG-1000 gauges.

## TEC Example 6


### Multiple 3 Fan System (4 DG-1000 Gauges – combination of wireless and wired communication)



#### Wired Connections

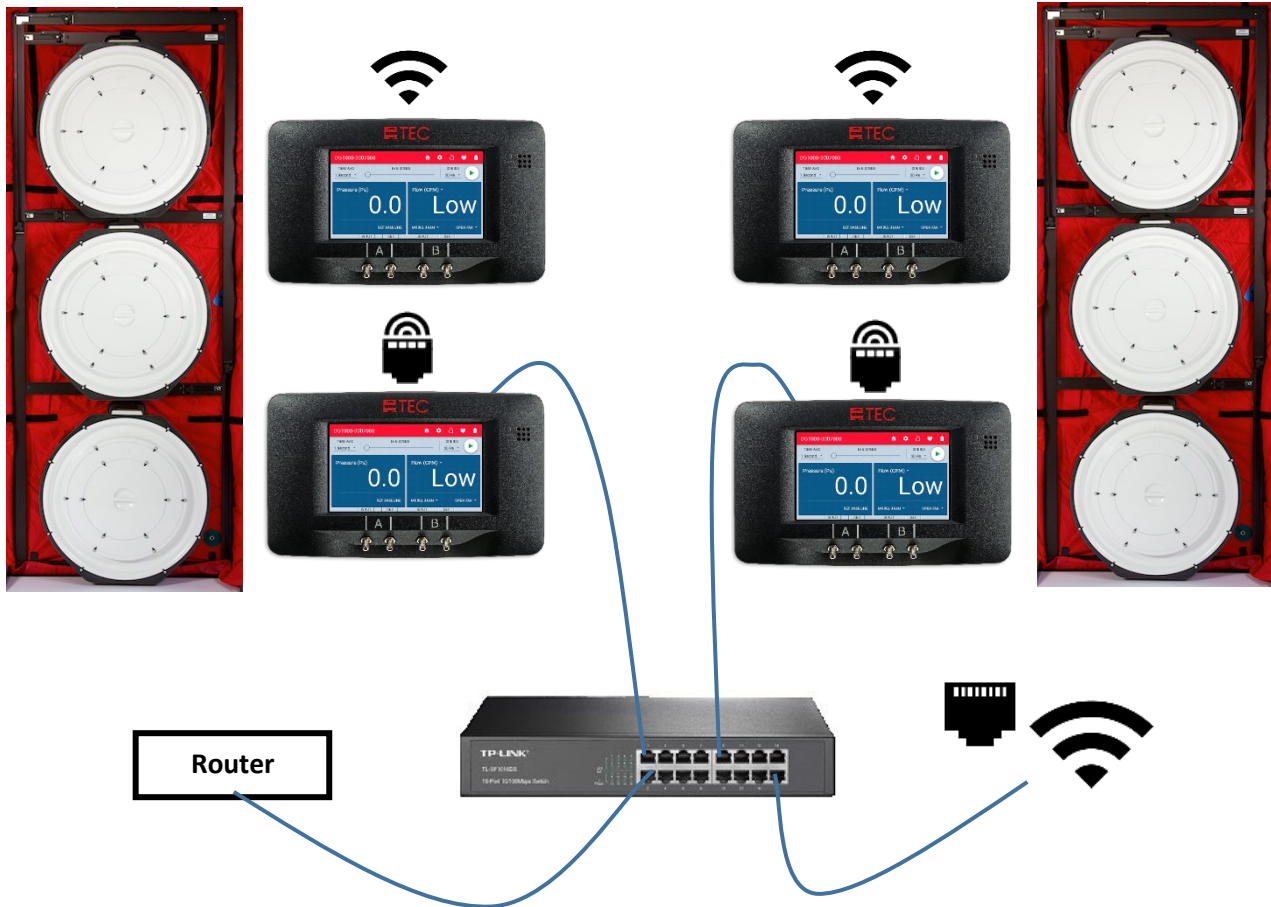
- Both DG-1000 gauges in one 3 Fan System with the network configuration set to **Ethernet** .
- Both gauges are connected to an Ethernet switch.
- A router is also connected to the Ethernet switch. The router is connected using a LAN port on the router.
- Using the **Ethernet** networking option on the DG-1000 requires that a single device in the network is running DHCP server (this is the reason we have a router connected to the network).

#### Wireless Connections


- Both DG-1000 gauges in one 3 Fan System with the network configuration set to **Join Network** .
- Both gauges are joined to the wireless network being broadcast by the router.
- The laptop computer is also joined to the wireless network being broadcast by the router.
- This setup can be expanded for additional Blower Door systems and DG-1000 gauges.

## TEC Example 7


### Multiple 3 Fan System (4 DG-1000 Gauges – Ethernet Bridge communication)



#### Wired Connections

- 1 DG-1000 gauge in each 3 Fan System with the network configuration set to **Create Network** (with the Ethernet Bridge configuration enabled) . 
- Both gauges are connected to an Ethernet switch.
- A router and laptop computer are also connected to the Ethernet switch. The router is connected using a LAN port on the router.
- Using the Ethernet Bridge configuration option on the DG-1000 requires that a single device in the network is running DHCP server (this is the reason we have a router connected to the network).

#### Wireless Connections

- 1 DG-1000 gauge in each 3 Fan System with the network configuration set to **Join Network** .
- Each gauge is joined to the wireless network being broadcast by the 2<sup>nd</sup> DG-1000 gauge in the 3 Fan System that is set to **Create Network** (with Ethernet Bridge configuration enabled).
- This setup can be expanded for additional Blower Door systems and DG-1000 gauges.

# Planning, Preparing and Performing Tests

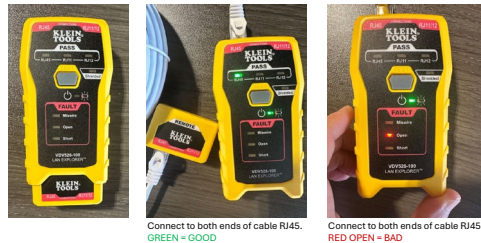
## Pre-Test Planning Tests

1. Ensure you have gauges, switches, router and ethernet cables in good condition
  - a. Gauges & Fans
    - i. Usually, calibration is required to comply with standards / contract
    - ii. <https://www.energyconservatory.com/calibration-repair/>
  - b. Switches
    - i. DG-1000's after S/N 9541 generally good compatibility with any switch
    - ii. For early versions of DG-1000, best luck with the NETGEAR switch



- c. A router is needed in each set-up to assign the IP addresses
- d. Ethernet Cables
  - i. Generally, CAT6 is recommended to avoid any issues in the field
  - ii. Check cables for continuity prior to test

Checking Ethernet Cables



## Building Prep per ASTM 3158

Category	Envelope (Closed Up)	Operational (In Use)
Natural Ventilation openings	Sealed	Closed and latched
Active or passive smoke control systems	Sealed	As found
Waste or linen handling systems & equipment	Sealed at rooftop chute vent openings	<ul style="list-style-type: none"> <li>• Rooftop vent = open</li> <li>• Chute intake doors = closed</li> <li>• Chute intake &amp; discharge room doors = closed &amp; latched</li> <li>• Fire dampers = as fnd</li> </ul>
Interior doors, hatches, and operable windows inside the test envelope that are normally closed	Open	Closed and latched
Other interior doors	Open	Open
Mechanical ventilation or AC openings	Sealed; equipment with dampers are to have dampers closed and opening sealed	Sealed
Intermittently used mechanical ventilation or AC openings	Sealed	Sealed
Clothes dryer/vent	Sealed	As found; seal vent if dryer is not installed
Windows, doors and roof hatches	Closed & latched	Closed and latched
Solid fuel appliance (ie fireplace)	Dampers closed; chimney sealed	Dampers closed
Openings not intended for ventilation	Sealed; floor drains and plumbing traps filled	Floor drains and plumbing traps filled