

Blower Door Testing of Multifamily Buildings



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The Energy Conservatory

In accordance with the Department of Labor and Industry's statute 326.0981, Subd. 11,

“This educational offering is recognized by the Minnesota Department of Labor and Industry as satisfying **1.5 hours** of credit toward **Building Officials and Residential Contractors** continuing education requirements.”

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Objectives

- Identify examples of programs requiring blower door testing of non-single family buildings
- Review commonly used airtightness testing standards
- Describe the difference between testing an individual unit and testing the building as a single zone
- Review the advantages to compartmentalizing units
- Identify the steps required to perform an airtightness test of a big building

- The 2012 IECC Residential Code
- The General Services Administration (GSA) requires testing of new government buildings
- Washington State commercial and multifamily residential buildings > 5 stories
- The United States Army Corps of Engineers
- EnergyStar High Rise and the LEED ETS

The 2012 IECC

- Residential and Non-residential Provisions
- Non-residential Provisions apply to all buildings except for residential buildings 3 stories or less In height
- Air leakage rate not exceeding 3 ACH
- Test at 50 Pascals
- Where required by the *code official*, testing shall be conducted by an *approved* third party

During Testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

- Code does not differentiate between single family and multifamily
- Testing options?
 - Whole building
 - Single unit
 - Single unit leakage to outside

BPI Multifamily Standard

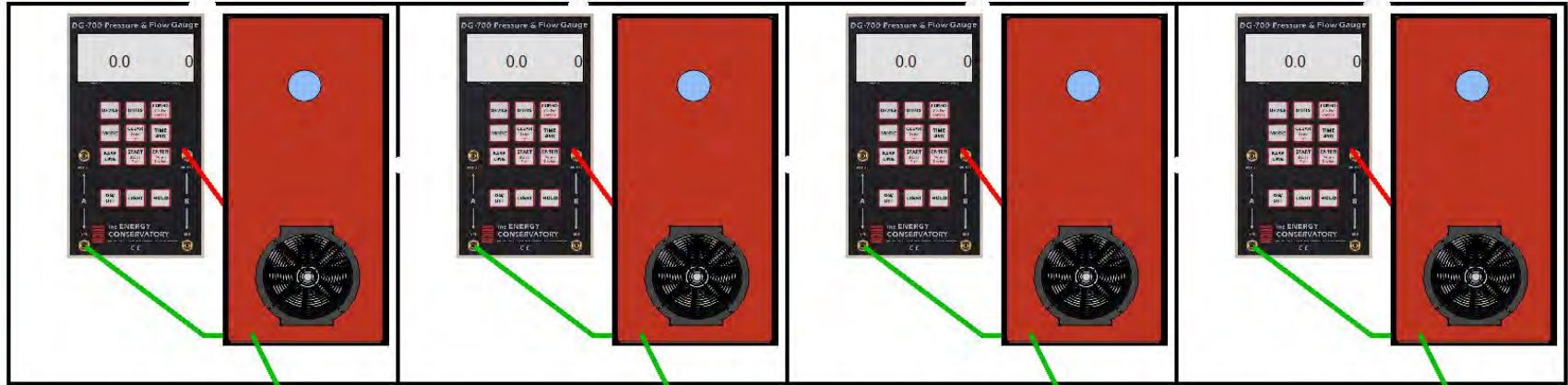
- Whole building or localized unit testing
 - ASTM E779
- Localized unit testing
 - Calculate energy savings – guarded test
 - Compartmentalize – unguarded

- RESNET test standard
 - Single point
 - Repeated single point
 - Multipoint
- Whole building
- Single unit / adjacent units open to outside
- Guarded test

Individual Unit vs Guarded

ZPD Trainer - Row Houses June 2012 v0.001

4 Zones - Left-click and hold on leaks to seal, Right-click and hold to unseal



Unit 1

Open Door

Unit 2

Open Door

Unit 3

Open Door

Unit 4

Blowerdoor Controls

Unit 1	<input type="text"/>	<input type="checkbox"/> Cruise 50	<input checked="" type="checkbox"/> depressurize	Fan Off
Unit 2	<input type="text"/>	<input type="checkbox"/> Cruise 50	<input checked="" type="checkbox"/> depressurize	Fan Off
Unit 3	<input type="text"/>	<input type="checkbox"/> Cruise 50	<input checked="" type="checkbox"/> depressurize	Fan Off
Unit 4	<input type="text"/>	<input type="checkbox"/> Cruise 50	<input checked="" type="checkbox"/> depressurize	Fan Off

Settings

Original sound

Restore Defaults Refresh Print

How are others doing it?



Gauges Outdoors



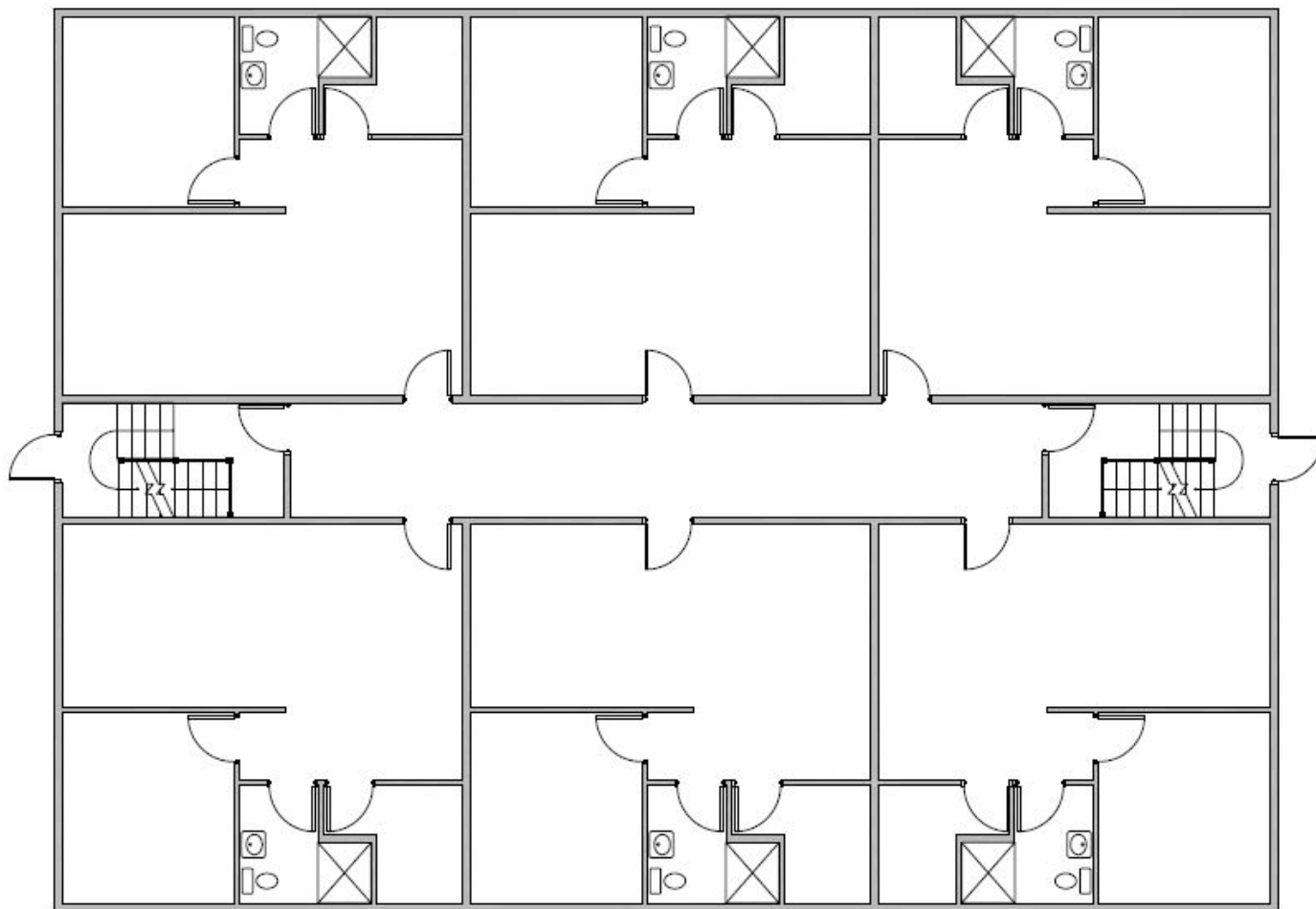
Fan caps



Setup the Computer



Individual Unit vs Whole Building



Advantages to Compartmentalizing Units

- Reduces sound transfer
- Reduces odor / pollutant transfer (ETS)
- Reduces wind effect
- Reduces stack effect
- Better able to control mechanical ventilation
- New construction
 - Seal plate to floor
 - Seal sheetrock at edges
 - Flanged / gasketed electrical boxes

Setup for a Single Unit Test

- Adjoining units open to outside?
- Hall open to outside or to rest of building?
- All building mechanical systems off?
 - Air handlers
 - Exhaust fans
 - Clothes dryers
- Set up in door to hall or window?

Testing a Single Unit



Duct Blaster fan
in a window

Testing a Single Unit



Duct Blaster fan
in a window

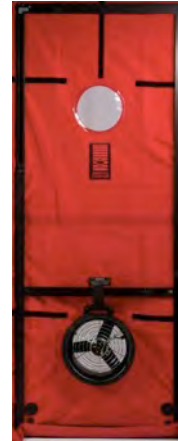


Duct Blaster fan
in a door

Testing a Single Unit



Duct Blaster fan
in a window

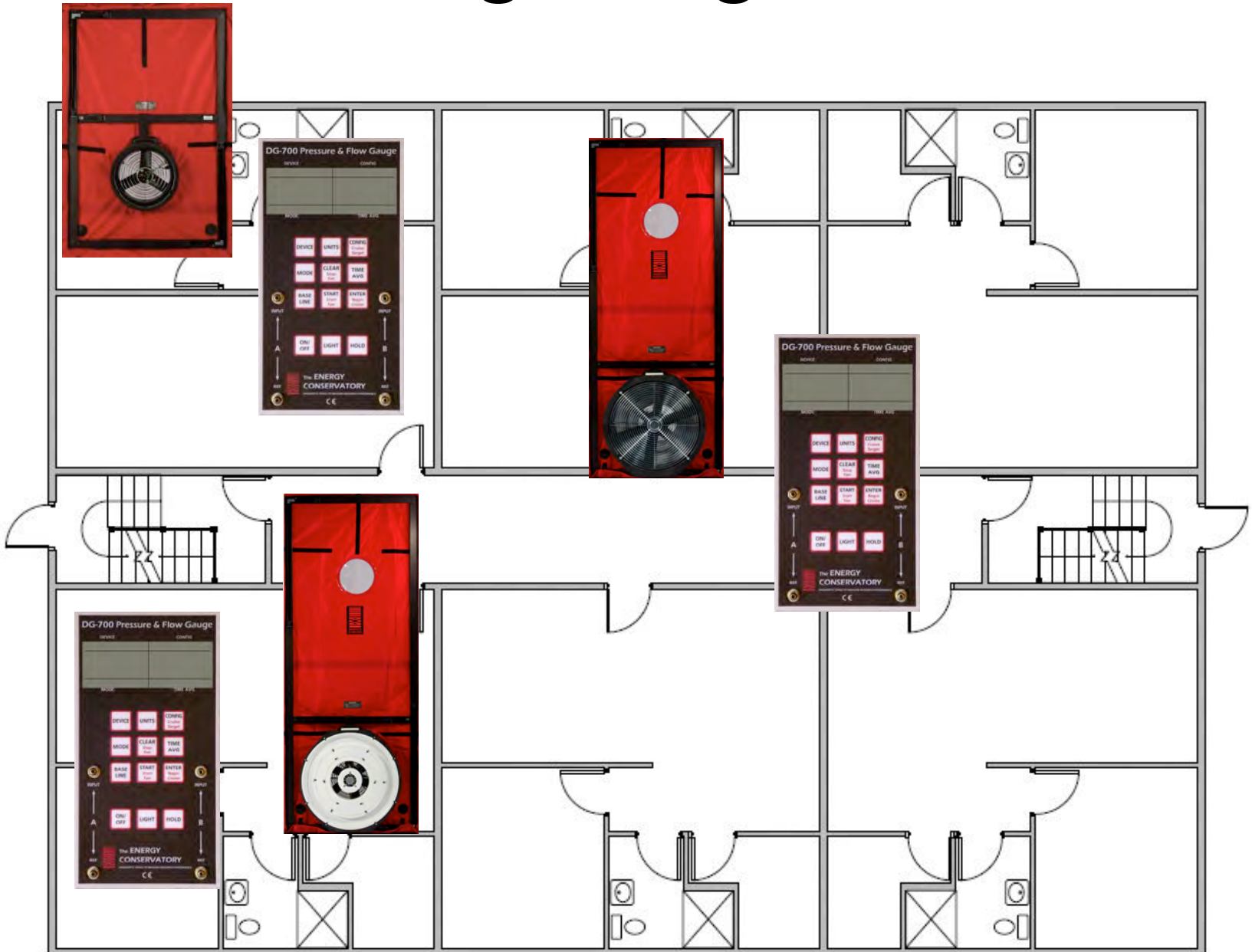


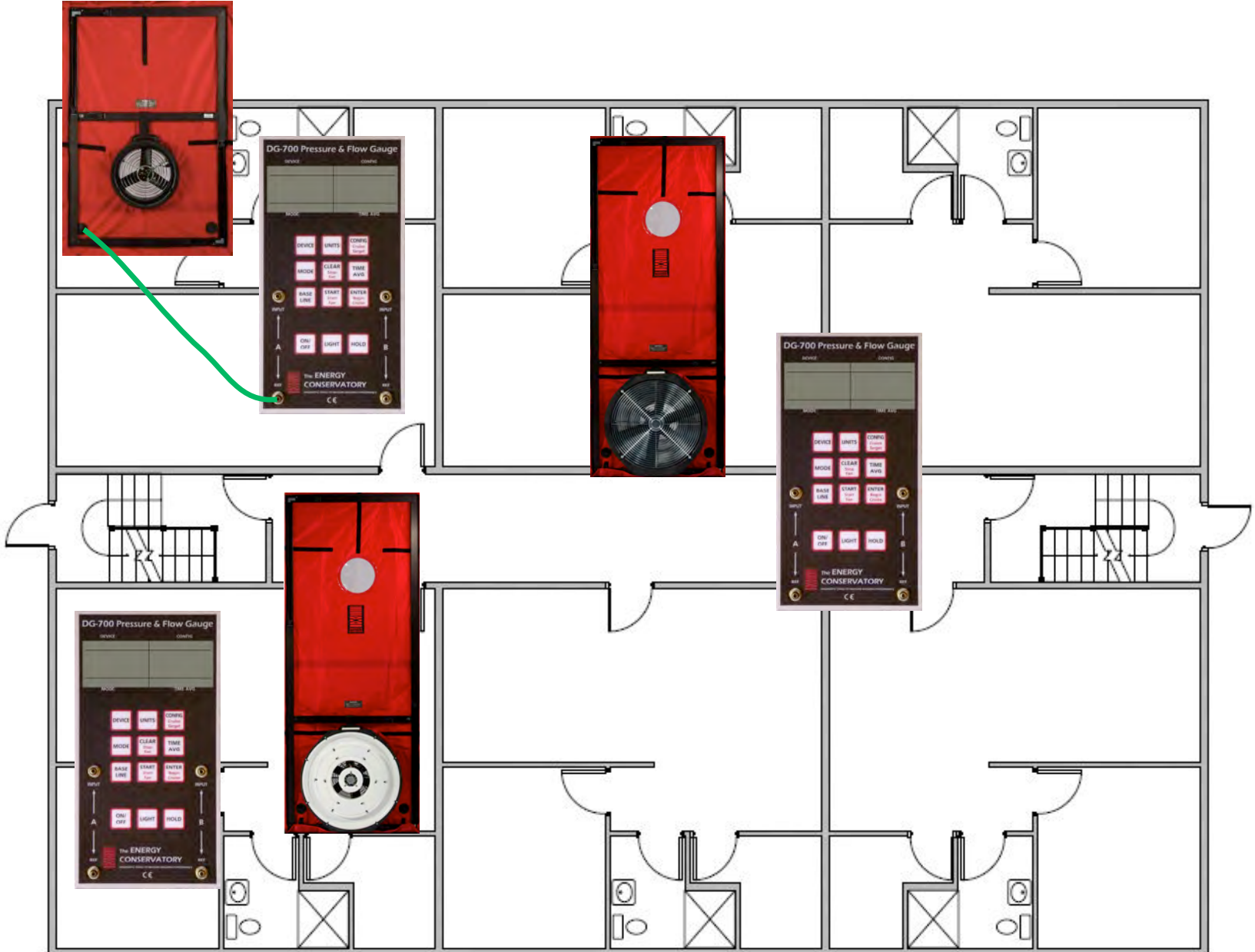
Duct Blaster fan
in a door

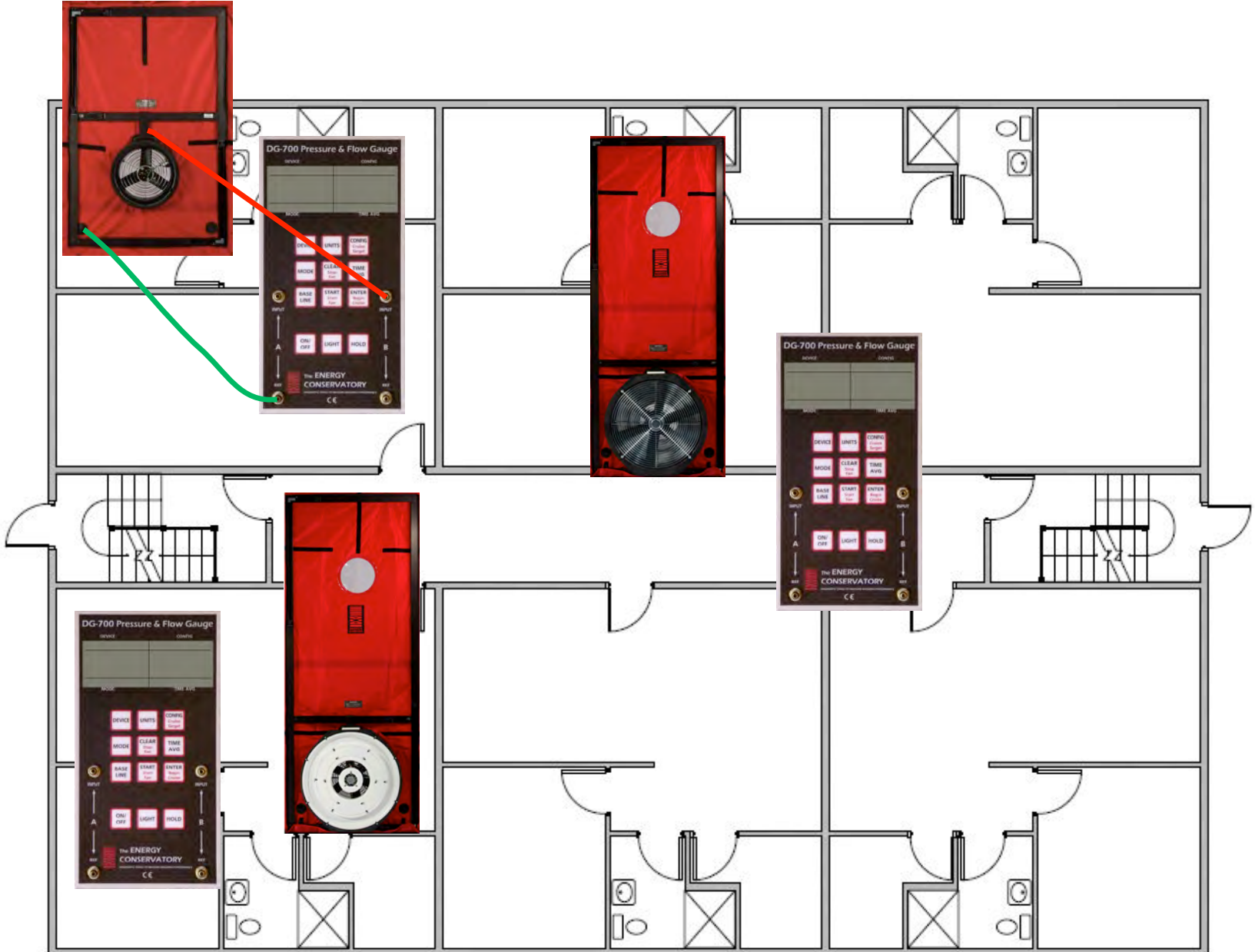


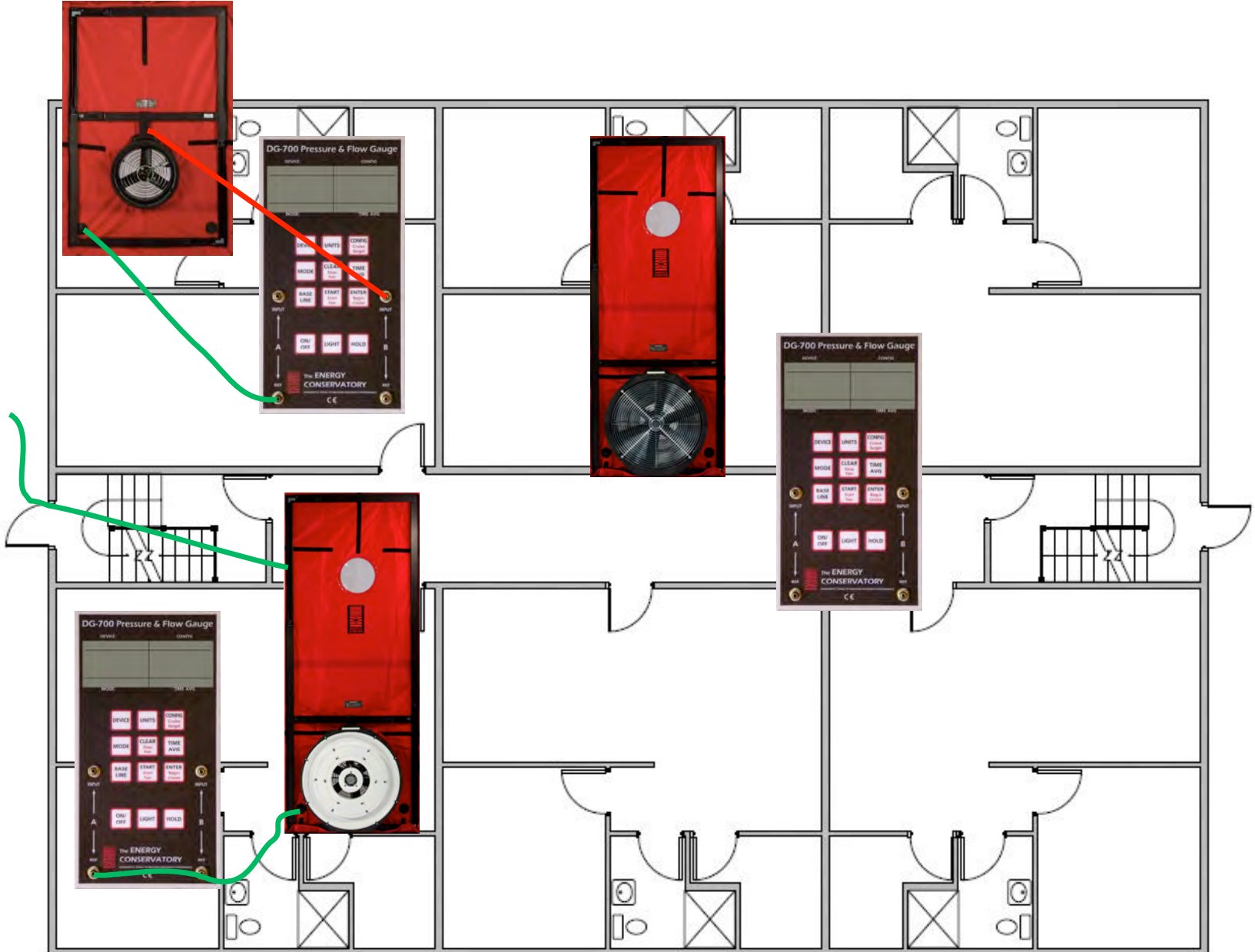
Blower Door
fan in a door

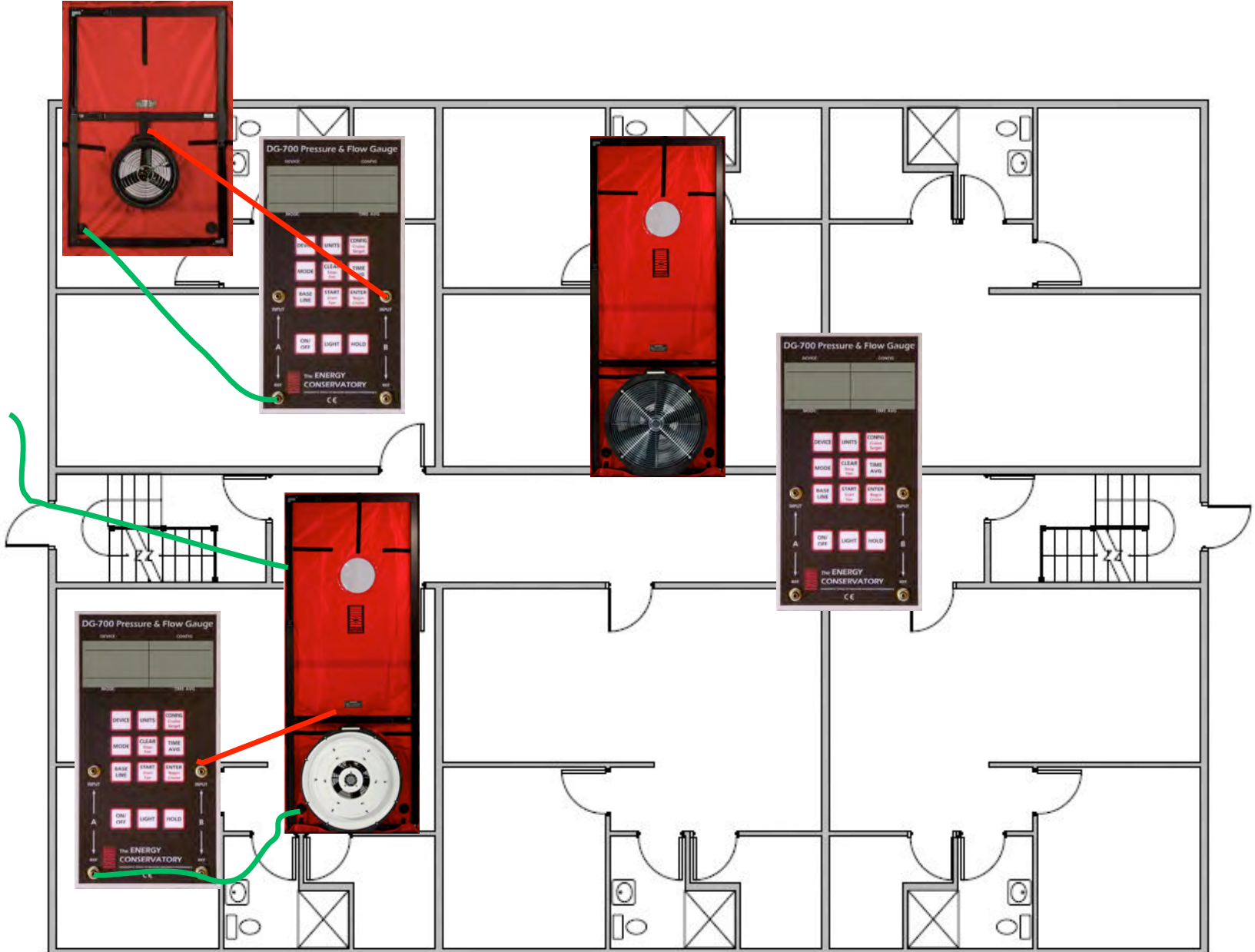
Testing a Single Unit

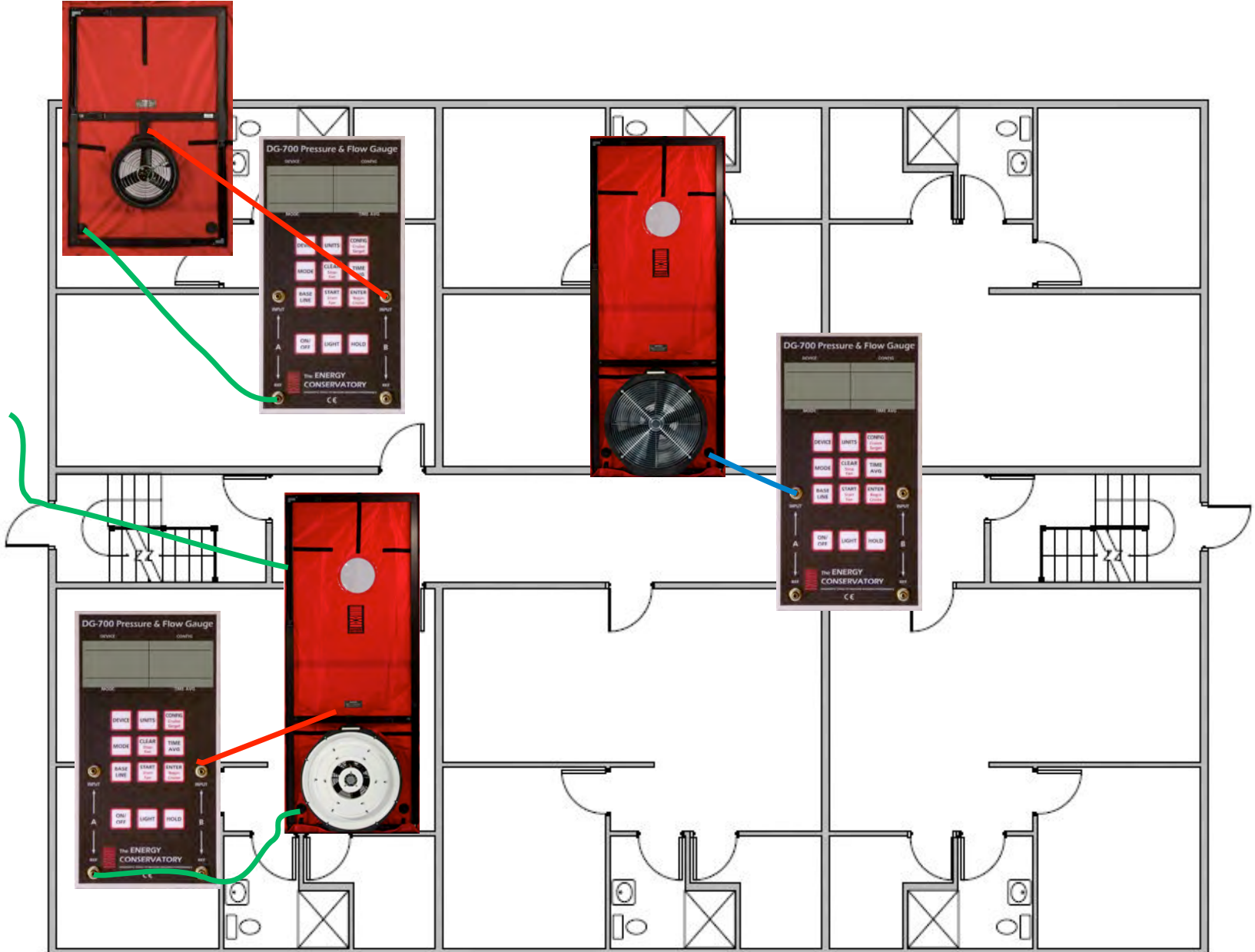


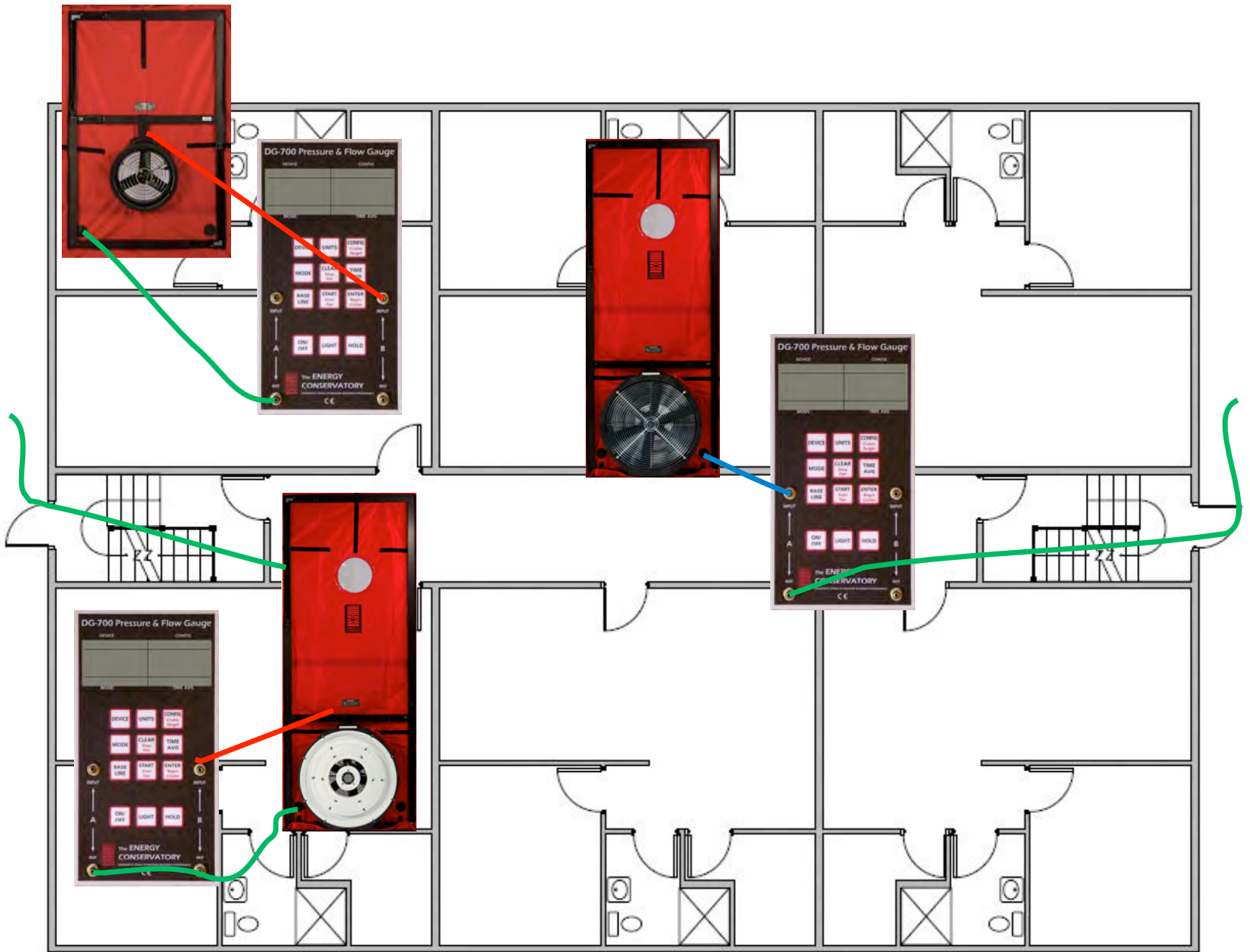


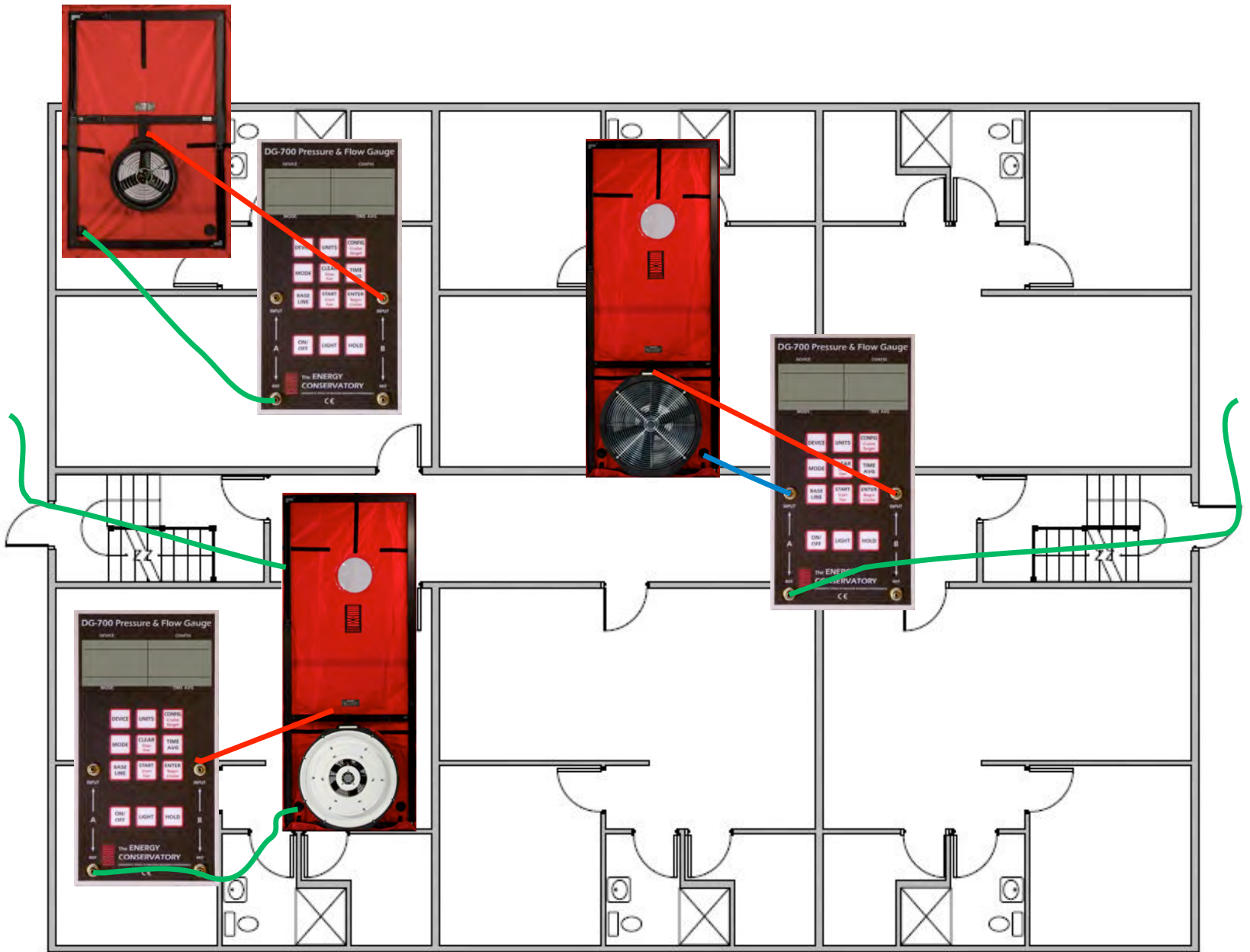


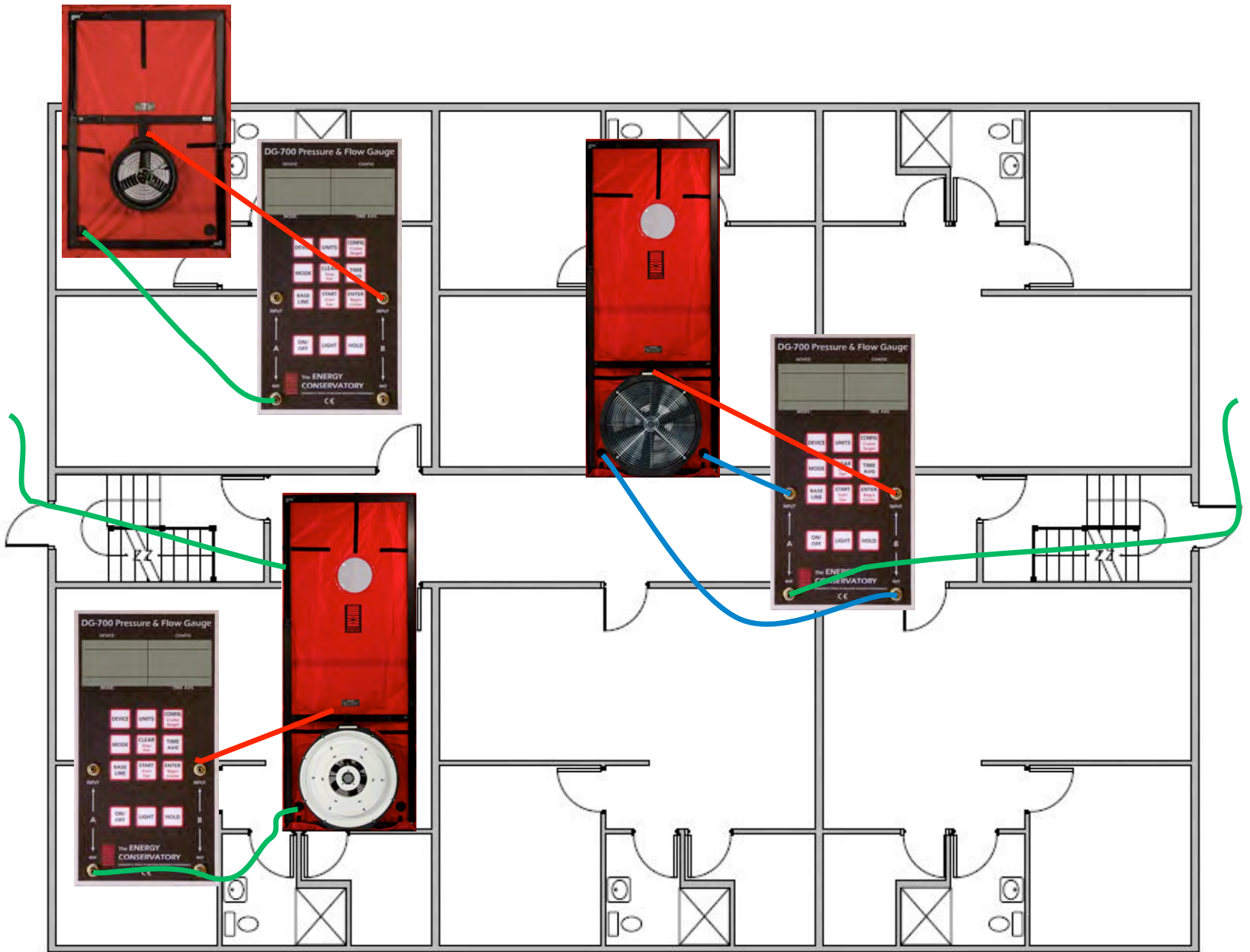


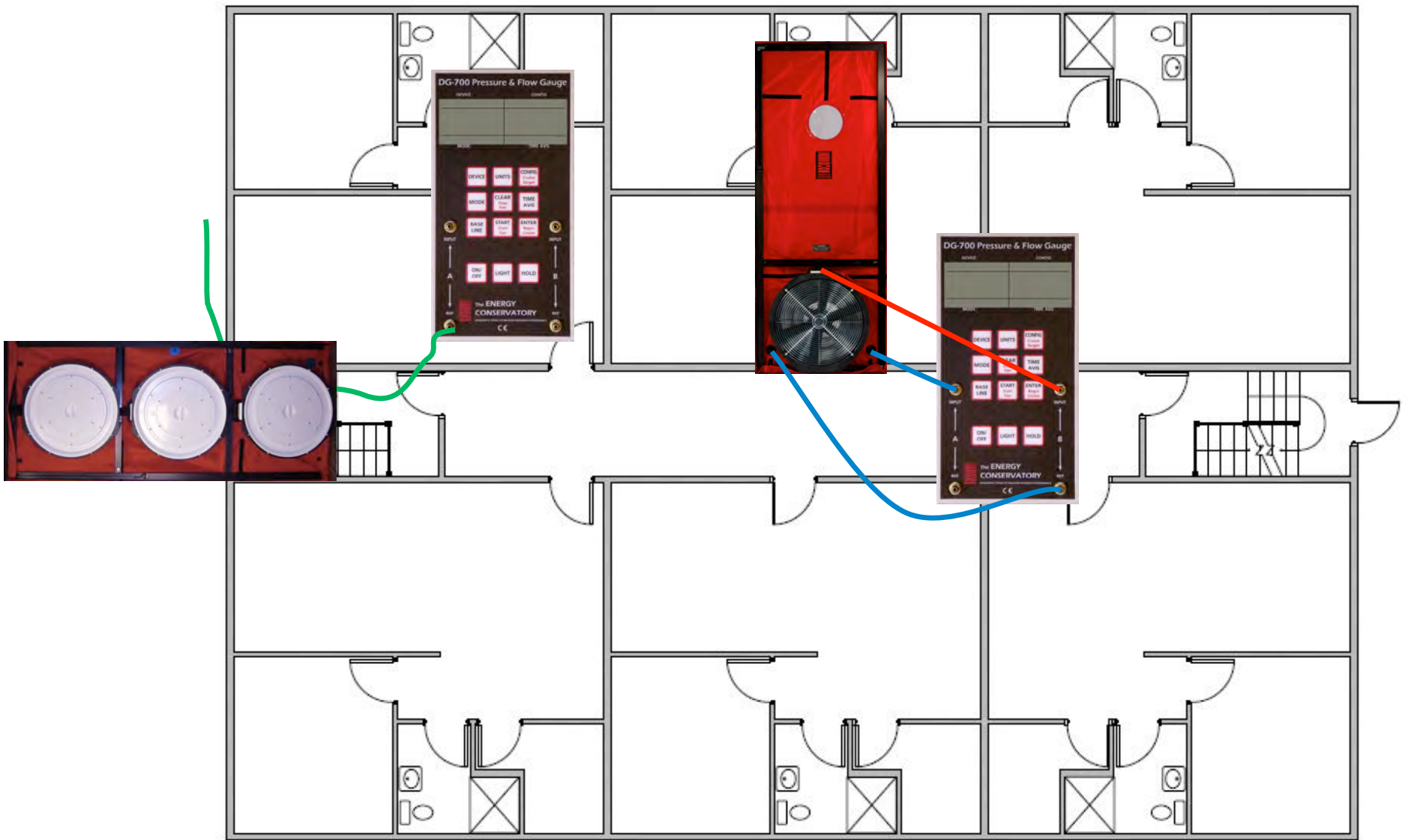












Whole Building Multi Fan Tests

- Two or 3 fan systems
- Manual test protocol
- Using TECLOG3

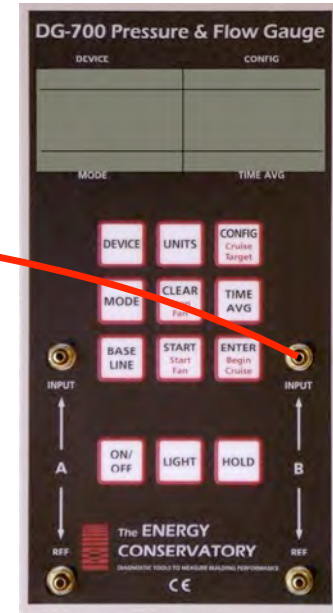


Two Fan System Setup for a Manual Test

Primary Gauge



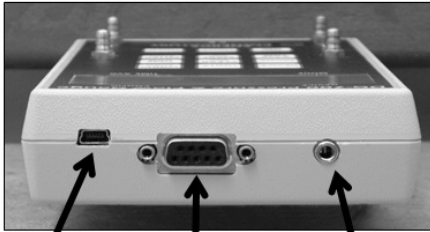
Secondary Gauge



Two Fan Manual 1 Point Protocol

- Primary gauge and Secondary gauge
- PR / FL mode
- Enter baseline into Primary gauge and turn Secondary fan all of the way up
- Determine flow ring for Primary fan
- Start Primary fan before removing ring
- Bring to 50 Pa
- Long term average on both gauges
- Record flows and add them together

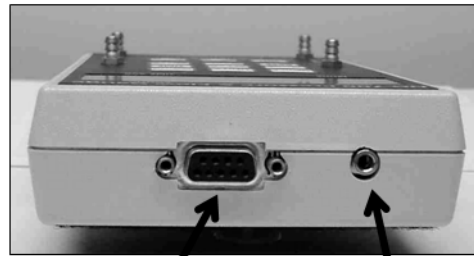
Automated Testing



USB
Communication
Port

Serial
Communication
Port

Fan Control
Output Jack



Serial Communication
Port

Fan Control
Output Jack



TEC WiFi Link



Setup the Equipment for an Automated TECLOG3 Test

- **Fan setup location:**
- Choose computer setup location
- Locate fans / gauges to minimize tubing
- Easier and better to run long lengths of CAT5

Setup the Equipment

Problems with long tubing:

- Stepping on tubing can result in pressure spikes.
- Tubing longer than 100 feet will cause measurement errors.
- Sun shining on long lengths of tubing will cause errors.

Setup the Fans



Setup the Fans



Setup the Fans

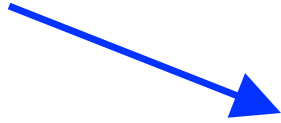


Setup the Fans



Two Gauges and Three Fans

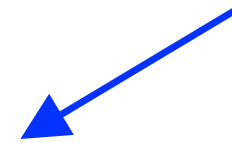
Gauge 1
A: Envelope Press.
B: Bottom Fan



3 Controllers



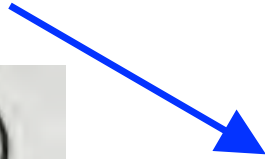
Gauge 2
A: Middle Fan
B: Top Fan



No open taps on gauges

2 Gauges and 3 Fans

3 way
Fan Control Splitter



3 Controller
Board



CAT5 Splitter

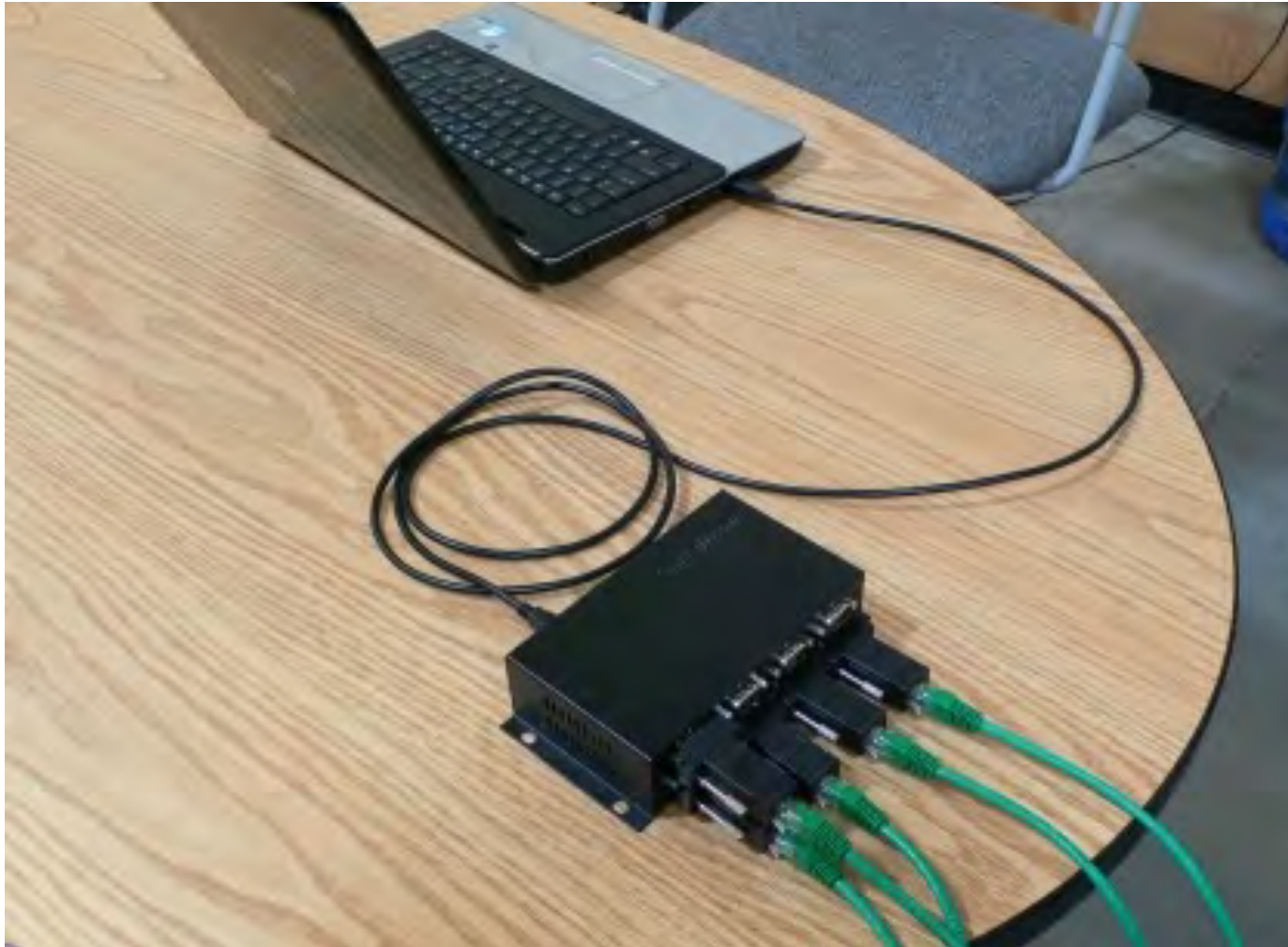


Kill-O-Watt
Meter

DB9 to CAT5 Adapter



8 Port Hub



WiFi Link







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Questions?



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