Model 88
EFA Scientific Comparator Test Stand
Dimensions : 68" H x 50" W x 75" D
1727mm H x 1270mm W x 1905mm D

GAS TURBINE AND JET ENGINE COMPONENTS

Effective Flow Area Measurement

PRODUCT REQUIREMENTS

Accurately analyzing airflow through jet engine and gas turbine components has been critical in the success of the aerospace industry. CCDI has satisfied manufacturers for over 40 years by offering quality airflow test equipment and part testing to GE, Garrett, Pratt and Whitney, Solar Turbine, and others.

SOLUTION: TIME PROVEN DESIGN

The Model 88 takes measurements of Barometric Pressure, Air Temperature, and Humidity to reliably measure Effective Flow Area (EFA). Continuous improvement has been made on the technology for over 15 years as the design was refined to optimize performance, making the Model 88 an accurate and stable EFA instrument ideal for area airflow measurements of vane rings and segments.

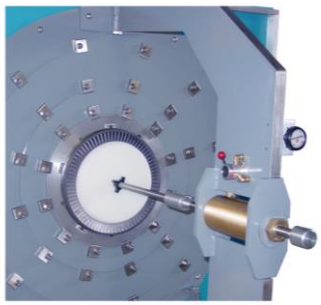
FEATURES

- Repeatability: +/- 0.1%*
- Step-by-Step Operator Software option
- Various configurations such as 88S-20, 88D-30, 88D-40 and others
- Uses Orifice Plates, ASME Nozzles, ASME Arrays
- Choice of NIST Traceable or dimensionally calibrated Orifices
- Current Available in English and French, other languages are possible
- Uses modern Microsoft .NET framework

* Conditions: Orifice plate at conditions of 70 Deg +/- 2 Deg F, 5” WC, less than 15 Sq. In. typical, depends on Model configuration. Call for additional repeatability details.

Cincinnati Control Dynamics, Inc
4924 Para Drive, Cincinnati, OH 45237
Ph: (513) 242-7300
Fax: (513) 242-5691
http://airflowmachines.com

ASME Calibration Nozzles



Front View of Clamp

SYSTEM SPECIFICATIONS

- NIST Traceable EFA
- All air density parameters are measured
  - Room and Plenum Temperatures
  - Barometric and Plenum Pressures
  - Dew Point (Humidity)
- 30 or 40 AC Blower Motor – Various Blower/Compressor Range Configurations
- No reference blower needed
- Closed Loop AC Flux Vector Motor Controller with 1.0 to 4,999.9 RPM, no brushes to wear out.
- Software Controlled Clutch and Shut off Mechanism for choosing single or dual blower operation
- Large blower can be disengaged by clutch (software controlled for small part measurement)
- Less Than One Minute per EFA Measurement
- Takes Pressure or Vacuum (Optional) Measurements and Displays in Square Inches, Sq. Centimeters or Square Millimeters
- NIST Traceable Calibration Orifice Plates and ASME Subsonic Area Masters
- Customer Correlation Table for Each Part
- Four QC Reports and Data Acquisition File
- Automatic Data Acquisition, can be transferred over network
- Multiple Manufacturers Test Specs and Formulas
- GE, Garrett, P&W, and Solar Turbine Part Testing
- Free Operator Training, Testing and Certification
- One-Year Warranty on Parts and Labor
- Pressure from 0.5 to 20 H_2O, not limited to 0.5, 1 and 5" like other units
- Higher accuracy transducers, such as 0.01%FS optional
- All Controls to PC are via COM ports

Flow Capabilities

0.5 to 30 sq. in. Measurements (3.23 to 193.55 cm^2) at 5" H_2O (Water Column) , 1.012 pressure ratio
40 in^2 available with 40HP Motor Option
Pressure Range: 0 to 20" H_2O (Water Column), 1 to 1.049 pressure ratio, 0-20" H_2O Vacuum optional

FACILITY REQUIREMENTS

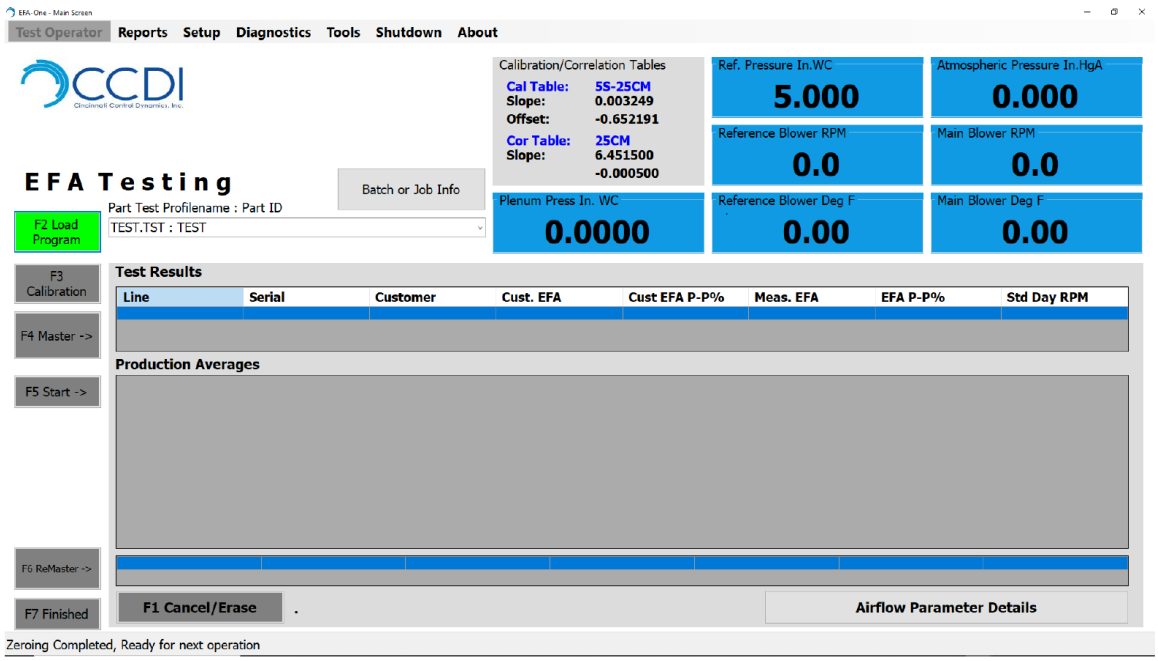
Electrical Power	380 - 460 VAC 3-phase 30 to 100 Amps, depending on power requirements for testing
Inlet Air Connection Pressure Range	30 to 100 PSIG (207 to 690 kPa) Pressurized Air Supply (filtered, compressed air at ambient temperature)
Temperature Range	50 - 100°F (10 - 38°C)

SOFTWARE

The Model 88 EFA Test Stand has new software called "EFAOne". We simplified the user interface greatly. Here are some of the screens:

Test Screen – This is the overview of the testing and handles the workflow.
Flow Test Screen – This is where the flow test is carried out
Calibration Screen – The orifice plates and ASME nozzles are calibrated and managed here.
Correlation Screen – The correlation references are measured here and managed here.

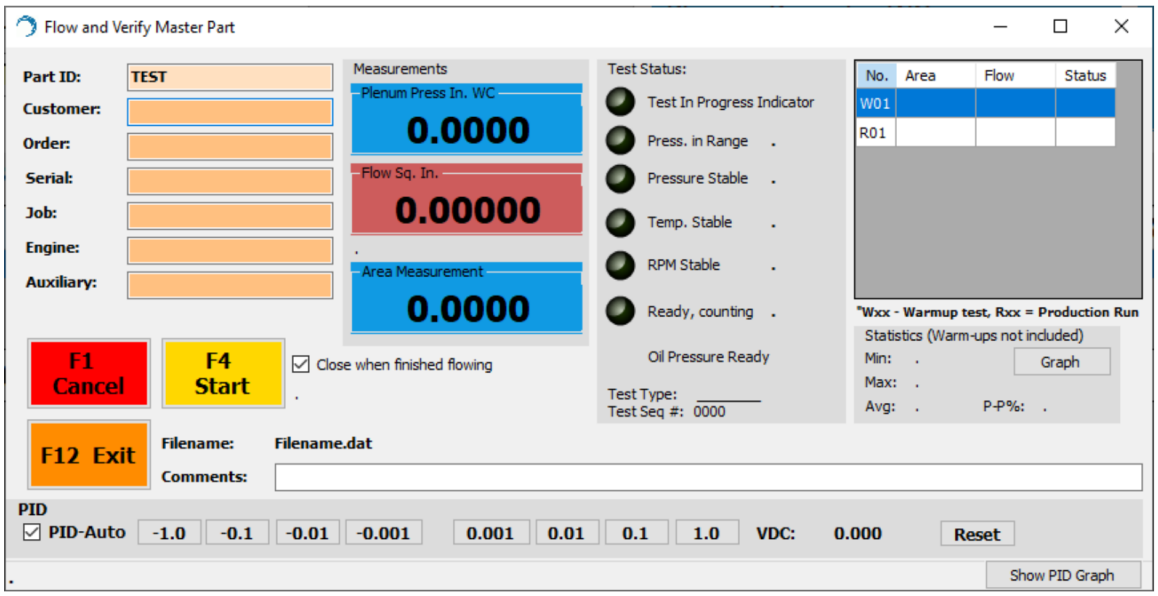
Setup Screen - Carries the machine's configuration and calibration data.
Test Parameter Details - Measurement stability indicators regarding temperature and pressure as well as PID parameters and other testing details are selected on this screen.



Test Screen

Test Screen Features:
1. Part tests are stored in profiles that reference orifice plates and correlation parts which are shared by other parts.
2. Each step-by-step process is handled by the workflow buttons on the left. As each process is completed the next step highlighted.
3. Results are tabulated on the Test Screen as a batch showing mastering and measurements.
4. Flow test conducted on "Flow Test" Screen, shows averaging, pass/fail status, stores lots of information with every test.

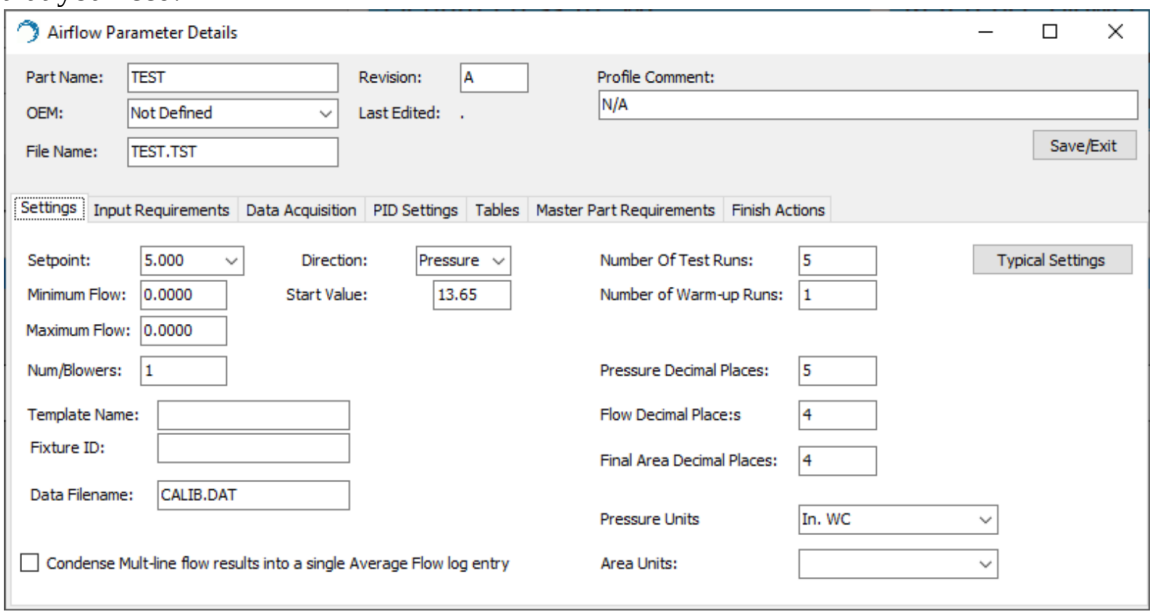
Flow Test Screen:



This screen pops up when conducting a flow test. The "Test Status" shows LED-like indicators as each condition reaches proper "steady state" to take final measurement.

Airflow Parameters

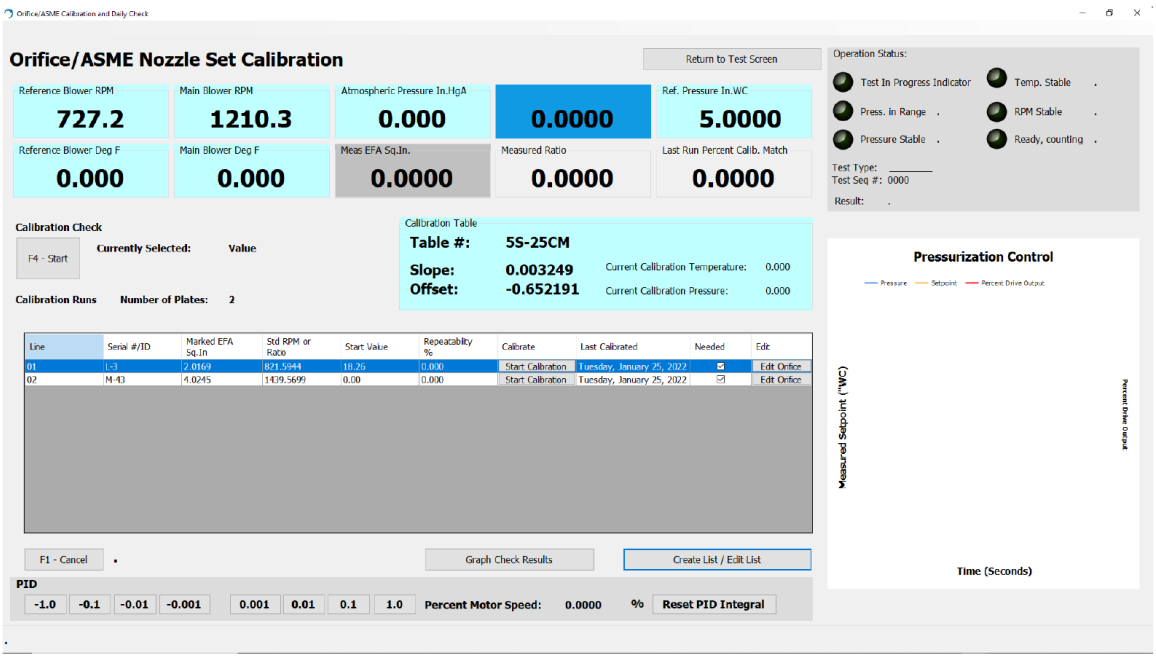
Certain screens are limited to users with certain password levels. We have reorganized these parameters sections to make them less overwhelming yet still give you the control that you need.



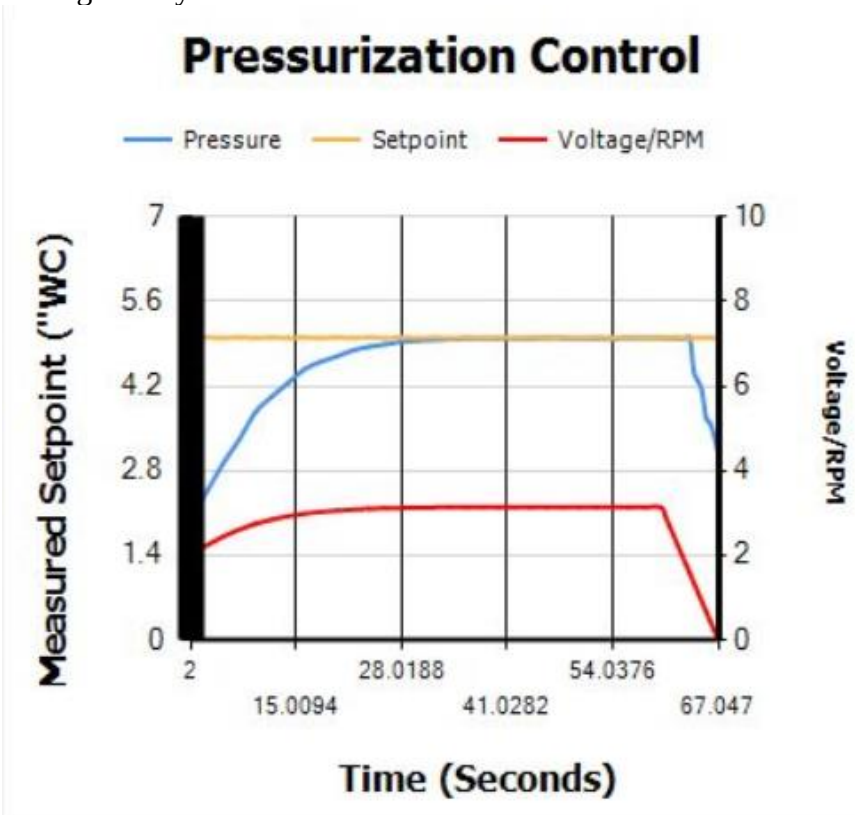
Orifice plate calibration.

Flow ranges no longer need to have three orifice plates to define a range. The new EFAONE software does EFA vs Standardized RPM. We call this "Standard Day RPM" because it stores and compares the RPM to values that are correct to a standardized

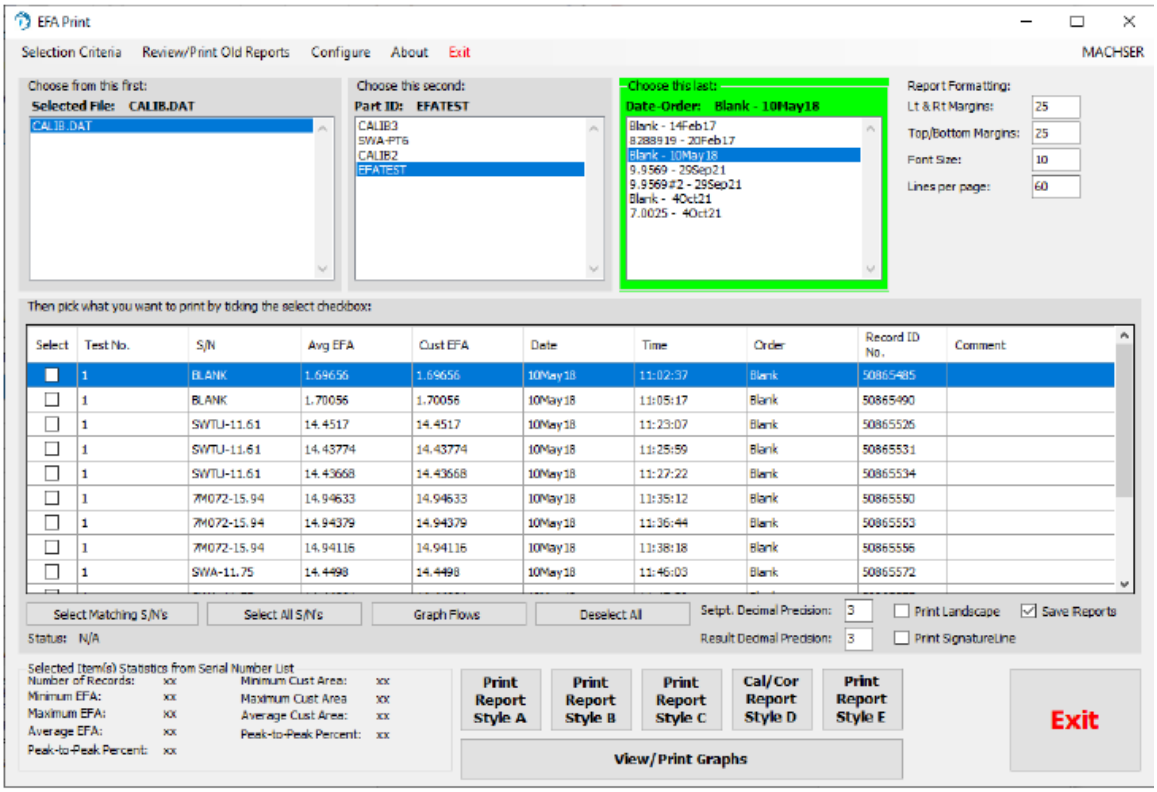
Atmospheric Pressure, Temperature and Humidty. Therefore, it can deal with changes much better than a reference blower can.



During a test you can monitor the motor and PID controls:

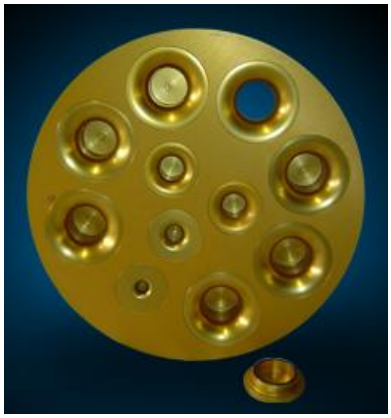


We have a report generator that allow selections of part tests and browsing of data.



Calibration Masters

CCDI offers the unique “ASME Nozzle Array” which is used transfer NIST traceable EFA standard to orifice plates. The standard has a five-year calibration and dial up flows in 0.5, 1, 2 and 5 Sq. In. Increments up to 30 or 40 Square Inches depending whether the 9-position or 11-position array is used. The flows to each opened nozzle is additive to make a total flow.
Corporations can use this array as their master standard and use it to control orifice plate calibrations at all their various satellite branches for more uniformity.
We can calibrate these at various pressures as well using our Sonic Nozzle transfer standards.



Photos

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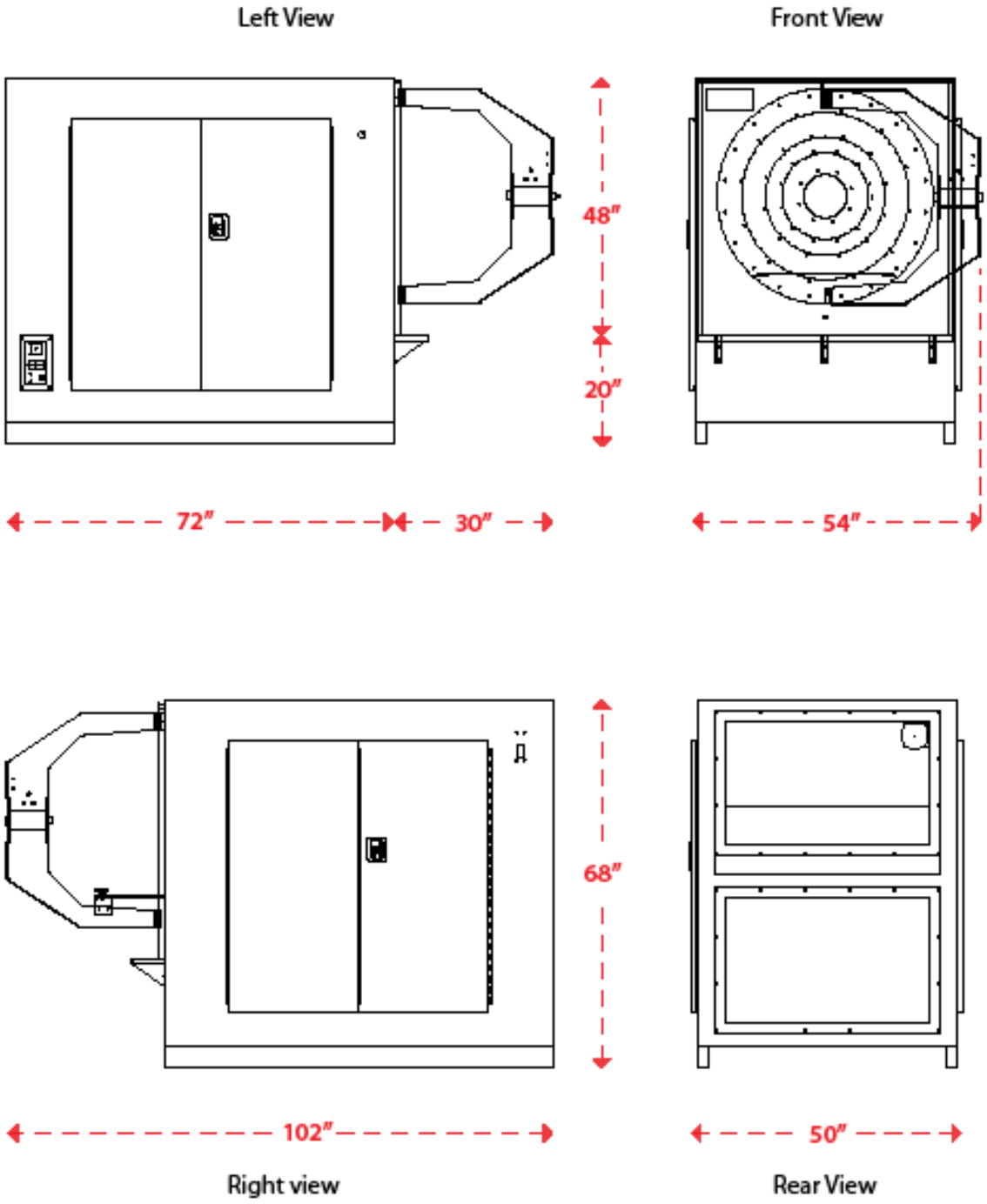

Space Requirement		
	Ideal	**Minimum(longer Stabilization Time)**
Front(ft.)	40	20
Rear(ft.)	15	10
Sides(ft.)	8 on either side	5 on either side
Top(ft.)	3	3