



Model 620
Portable Automatic Airflow Test Stand

Dimensions: 17" H x 22" W x 12.7" D
559mm H x 432mm W x 322mm D

GAS TURBINE AND JET ENGINE COMPONENT TESTING

Portable Mass Airflow Test Stand

PRODUCT REQUIREMENTS

Multiple manufacturers in the Aerospace industry required Airflow Test Stands to calculate Mass Airflow and test equations. Flow test sequences, called "circuits," can automatically flow air with multiple test steps and various airflow equations (such as specialized reduced airflow measurements). CCDI was first in the industry to offer such test equations, and has continued to do so for over 40 years. The Automatic Airflow Test Stand is now available in the portable Model 620 for easy use and convenience.

A VERSATILE SOLUTION

CCDI has been developing Airflow Test Stands since 1976 and automated units since 1986. The years of experience resulted in a refined design of a product that considers the fast-paced nature of the industry. CCDI continues to satisfy customers by adding new test requirements from various turbine manufacturers.

FEATURES

- Accuracy: +/- .50% Standard
- Repeatability: +/- 0.25% Standard
- Latest version of Windows Based Software
- Preloaded with your manufacturers Test Specs and Formulas, automatic correction
- Six Nozzle design with ability to combine nozzle brings maximum measuring range
- Small internal volume for rapid measurements
- Circuit switching, pressure control and acceptance, fully automatic
- EDI feature for piping data to network systems
- Will operate on Notebook Computer
- Configurations Available: 620EL, 620S, 620L, 620M, 620H, 620XH



Model 620 Calibration Ports



Model 620 Flow Ports

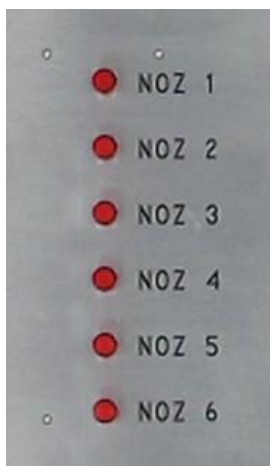
The Model 620 offers two flow ports and fixture air regulator comparable to the larger machines.



Model 620 Box Closes for Transport



On Wheels for Easy Relocation



Nozzles Clearly Indicated



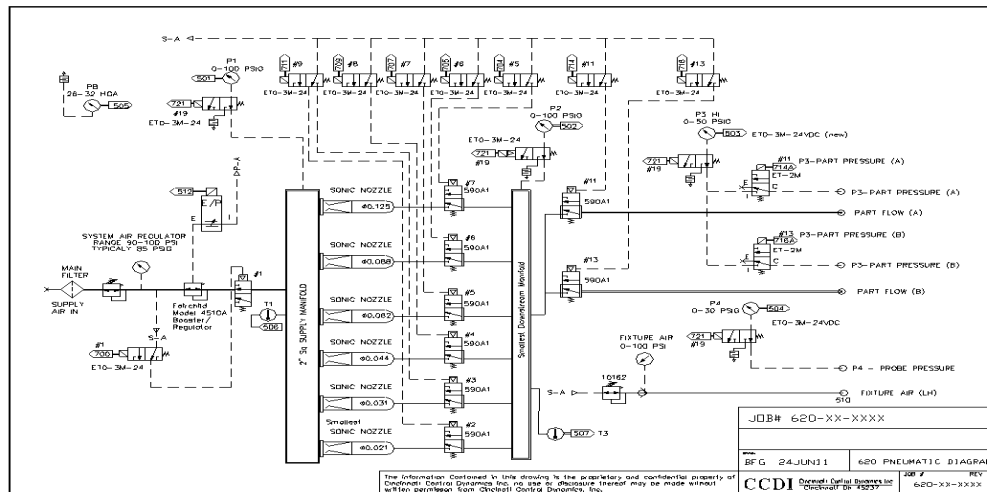
Fixture Air



Electronics Interface Access

SCHEMATIC

The Model 620 is equipped with up to six (6) Sonic Nozzles to measure Mass Airflow.



Sonic Nozzle P1/P2 pressures are monitored during testing and provide a real time "Not-Sonic" message if the nozzle is not in a "choked" state.

SYSTEM SPECIFICATIONS

NIST Traceable Airflow Measurement, ANSI/NCSLZ540

Flow Measurement Accurate to +/- .50% - Typical Mass Flow Uncertainty: 0.57%

Flow Measurement Repeatable to +/- 0.25% - Based on 50 flow measurement samples

GE Aircraft, GE Power, P&W, ABB, Honeywell, Siemens, Rolls-Royce, and Solar Parts Testing

10 to 45 Seconds per Part Test

Fully Automatic Operation and Pressurization

Sonic Nozzles (6) – with Automatic Size Selection Single or Dual Sonic Flow Nozzle Operation

Part Test Profiles Available for Hundreds of Engine Parts

English and SI Units

High MTBF Industrial Solid State disk PC with, LED Display

Latest version of Windows, Ethernet ready

QC Report, Label, and Data Acquisition File

Operator Training, Testing and Certification at CCDI

Two-Year Warranty on Parts and Labor

Standard 'off-the-shelf' components.

Can also flow small Effective Flow Area measurements in mm², cm², and in²

Weighs 98 pounds (44.45 kg)

Configurations Available

Model	Nozzle Size	Flow Capability at 20-85 PSIG Nozzle Pressure	P&W Flow Parameter
620EL	0.010" to 0.044" (0.025 to 0.112 cm)	0.000003 to 0.0052 Pound-mass per Second (0.0000014 to 0.0024 kg/s)	0.000099 to 0.00814

620S	0.015" to 0.062" (0.038 to 0.158 cm)	0.00014 to 0.0104 Pound-mass per Second (0.000064 to 0.0047 kg/s)	0.00022 to 0.01628
620L	0.021" to 0.088" (0.053 to 0.224 cm)	0.0003 to 0.0208 Pound-mass per Second (0.00014 to 0.0094 kg/s)	0.00047 to 0.03257
620M	0.031" to 0.125" (0.079 to 0.318 cm)	0.0006 to 0.042 Pound-mass per Second (0.00027 to 0.019 kg/s)	0.00094 to 0.06576
620H	0.044" to 0.177" (0.112 to 0.450 cm)	0.0012 to 0.0844 Pound-mass per Second (0.0054 to 0.038 kg/s)	0.00189 to 0.13214
620XH	0.062" to 0.250" (0.157 to 0.635 cm)	0.0024 to 0.1687 Pound-mass per Second (0.0011 to 0.077 kg/s)	0.00376 to 0.26412

Airflow Flow Test Stand Flow Ranges (see nozzle sizes)

NOZZLE	Min Flow	Max Flow	Min	Max	Min	Max	Min	Max
DIA.IN.	lbs/sec	lbs/sec	FP	FP	EFA	EFA	EFA	EFA
					@5"H2O	@5"H2O	@10"H2O	@10"H2O
0.015	0.00014	0.00041	0.000222	0.000643	0.0018	0.0052	0.0013	0.0037
0.021	0.0003	0.0008	0.000437	0.001260	0.0035	0.0102	0.0025	0.0072
0.025	0.0004	0.0011	0.000619	0.001785	0.0050	0.0145	0.0036	0.0102
0.031	0.0006	0.0017	0.000951	0.002745	0.0077	0.0223	0.0055	0.0157
.021+.031	0.0009	0.0025	0.001388	0.004004	0.0113	0.0325	0.0080	0.0230
.025+.031	0.0010	0.0029	0.001571	0.004530	0.0127	0.0367	0.0090	0.0260
0.044	0.0012	0.0035	0.001917	0.005530	0.0155	0.0448	0.0110	0.0317
.021+.044	0.0015	0.0043	0.002354	0.006790	0.0191	0.0551	0.0135	0.0389
.025+.044	0.0016	0.0046	0.002537	0.007316	0.0206	0.0593	0.0146	0.0420
.031+.044	0.0018	0.0052	0.002868	0.008275	0.0233	0.0671	0.0165	0.0475
0.062	0.0024	0.0069	0.003807	0.010980	0.0309	0.0890	0.0218	0.0630
.062+.031	0.0030	0.0086	0.004759	0.013726	0.0386	0.1113	0.0273	0.0787
.062+.044	0.0036	0.0104	0.005724	0.016510	0.0464	0.1339	0.0328	0.0947
0.088	0.005	0.014	0.007668	0.022120	0.0622	0.1794	0.0440	0.1269
.088+.044	0.0060	0.0174	0.009585	0.027651	0.0777	0.2242	0.0550	0.1586
.088+.062	0.0072	0.0208	0.011475	0.033102	0.0931	0.2684	0.0658	0.1899
0.125	0.010	0.028	0.015473	0.044633	0.1255	0.3619	0.0888	0.2560
.125+.062	0.013	0.037	0.020232	0.058359	0.1641	0.4732	0.1161	0.3348
.125+.088	0.015	0.042	0.023141	0.066754	0.1876	0.5413	0.1327	0.3829
0.177	0.02	0.06	0.031024	0.089491	0.2516	0.7257	0.1780	0.5133
.177+.088	0.026	0.074	0.040609	0.117143	0.3293	0.9499	0.2329	0.6720
.177+.125	0.029	0.084	0.046497	0.134125	0.3770	1.0876	0.2667	0.7694
0.250	0.04	0.11	0.061891	0.178532	0.5019	1.4477	0.3550	1.0241
.250+.125	0.052	0.149	0.082123	0.236891	0.6659	1.9209	0.4711	1.3589
.250+.177	0.059	0.169	0.092915	0.268023	0.7534	2.1733	0.5330	1.5374

Notes:

FP = Flow Parameter lbs/sec * Sqrt(Temperature) / Room Pressure

EFA = Square Inch Area Measurement - Requires Inches of water gauge option

FACILITY REQUIREMENTS

Electrical Power and Air	100-250 VAC Single Phase, 50-60 Hz, 5A Service Pressurized air at 100 psig, dry to 0° F Dew Point		
Pressure Range	0.5 to 50 PSIG – Standard 0-50 Inches Water Gauge – Optional		
Temperature Ranges	T1 Upstream Temperature 46-120°F (8- 49 °C) T3 Part Downstream Temperature 46-120°F (8- 49 °C)		
Transducer Pressure Ranges	P1 Upstream Pressure	0-100 PSIG (0-690 kPa)	0.10% FS
	P2 Downstream Pressure	0-100 PSIG (0-690 kPa)	0.25% FS
	P3 Part Pressure	0-50 PSIG (0-345 kPa)	0.10% FS
	P4 Probe Pressure	0-30 PSIG (0-207 kPa)	0.10% FS*
	PB Barometric Pressure	26-32"HgA	0.10% FS
	T1 Upstream Temp	46-120°F (8- 49 °C)	+/- 1Deg F
	T1 Downstream Temp	46-120°F (8- 49 °C)	+/- 1 Deg F

*Probe pressure is optional

SOFTWARE

CCDI Airflow Test Stands have basic operation screens and a calibration screen.

Test Screen - Users operate the machine from this screen.

Setup Screen - Contains the machine configuration and calibration data.

Diagnostic Screen - Displays state of valves and nozzles used.

Test Screen

Menu Bar - Allows navigation to other screens, selection of part test programs, finding information.

Identification Box - In the upper left corner box, fill in details associated with the airflow test that gets recorded and printed. This information is also kept with files that can be transmitted to a network.

Test/Log Box - CCDI machines can have up to 64 test sequences (or increased as needed) for a single part. The first box (short) is the real time results box that shows the test data in operation. The second box (long) is the log of the test results. Some software versions have three result boxes for parts that use "Exit Flow" measurements. The log provides a summary of test data.

Gauge Displays - Gauge measurement readings. They are automatically converted to units that match the parts being measured.

Test Parameters Box - Right corner box allows the test parameters and limits to be entered. More information can be entered by selecting "Detail," which will prompt the detail box.

Filename - This allows selection of a filename for the test data. The filename can be stored in the part "profile" - A file recipe in the hard drive for the next time you test.

PID Control Box - Displays activity of the pressurization controller and allows user to adjust values.

Message and Status Boxes - Messages from the system and operator instructions can be posted here.

Function Key Menu - Our test screen can be operated by mouse or function key.

Flow Test Details & Special Commands

Accept Band: %

☐ Auto Timer: Seconds

☐ Enable PID Multiplier:

Proportional:

Integral Gain:

Deriv. Gain:

Sample Rate:

Reset Time:

PID Adjust:

☐ Auto Step (at finish) to Next Circuit

☐ Keep air flowing for next flow test

☐ Startup Pressure Delay: Seconds

☐ Manual Nozzles: Noz #'s: Valve Enable:

☐ Require Serial Number

Starting Voltage:

Force Flow Port: *

☐ Always Record Voltage

User Instructions:

Test Data in (8.3) Filename:

Profile name: test.tst

Master Part Limits

R1 Max: R2 Max: R3 Max:

R1 Min: R2 Min: R3 Min:

☐ Perform Master Checking ☐ Disable testing on fail

Circuit No: 01

Detail Box

From this screen, you can adjust percent error allowed on setpoints and the "Auto Timer" to shut off the air for a certain period of time. This will end the test after the pressure is consistent for the selected time interval.

Auto-step allows the next flow sequence to proceed automatically. The Startup Delay makes time at the beginning of the test to stabilize.

Manual Nozzle allows the user to select the nozzles. The system defaults to setpoint and flow limit information. The Master Parts Limits section is to be completed by the user as well.

The PID Control (Pressurization) can be finely tuned for the most demanding production lines. Note: Fixtures/Tooling varies in volume. These parameters are adjustable to achieve the best response

Flow Testing Features

- CCDI Airflow machines were the first machines on the market with automatic sequencing.
- If you test a part in various manufacturing stages, the old data can be recalled at a later time to fill-in the blanks.
- Automatic or Manual, Single or Dual Nozzle Selection Available
- Two-stage cancel button can temporarily stop a test and restart; a second cancel can discard the results to start over.
- Beginning of a test can be paused for a specified number of seconds.
- Test results record all gauges and K values making analysis simple for auditing.
- In a Flow Restriction Test, the PID control can be turned off in order to monitor for flow restriction cause by external tooling.
- The program has leak tests that check for internal and external leaks at various stages
 - Our leak testing sequences can be automated
 - Volume based leak tests allow for fixed volume entry in testing parameters.
- The Diagnostic screen is great tool for technicians and makes understanding of the equipment easy for maintenance

Setup Screen - CCDI Mass Airflow

Utilities Save Setup Return to Test Screen Print Screen Change Password

Sonic Nozzle K Form

Nozzle 1	Dia:	PSIA	K
41.009	0.021	0.000187164	
42.990		0.000187296	
44.974		0.000187572	
50.000		0.000187926	
55.004		0.000188645	
60.005		0.000188912	
64.980		0.000189519	
74.991		0.000190227	
84.993		0.000190812	
89.998		0.000191529	

Date: 12-Sep-06
Calib. By: .
Sonic Ratio: 1.50
S/N: 644-27-021

Prev Next Apply

System Configuration Machine SN: 644-01-1234

Max. Shop Press: 85.00 Leak Test Delay: 08
Accept Band %: 0.30 Nozzle Count: 09
Xducer Input/Range: 10+100 System Series: 622
Acquisition Device: 5141 Display COM: 1
PID Reset Time: 10 Acquis. COM: 2

Dual Nozzle Selection: ☒ High Speed 232: ☐
Disable PID Control: ☐ Master Checking: ☐
Invert Digital Outputs: ☐ PID 2level Disable: ☐
Audit Flow Test: ☐ P3 Low Option: ☐
Blank Serial on Save: ☐ Don't forget to Save: ☐
Separate DATA Folder: ☒ Already Mastered: ☐
Record Starting Voltage: ☐ Part Recall Reset: ☐

Printout Title:
Printout 2nd: CCDI Mass Airflow Stand - SN: 644-34-1920

Pressurization PID Control

PID Control for: P3 - Nozzle 1

Prop. Gain: 0.250
Int. Gain: 0.100
Der. Gain: 0.010
Samp. Rate: 0.500

Next Apply

Sensor/Transducer Calib.

P1 Sensor Read

PSIG	% F.S.	
0.00	0.000	C
10.00	27.500	C
20.00	35.410	C
30.00	43.340	C
40.00	51.280	C
50.00	59.200	C
60.00	67.120	C
70.00	75.070	C
85.00	86.940	C
100.00	98.810	C

Date: 11-Dec-06
Cal. By: cls
S/N: 1095159

Prev Next Apply

Setup Errors / Notes / Warnings

Setup Screen: Contains nozzle calibration, transducer calibration, system configuration data, and built-in pressurization tuning information.

Diagnostic Screen - CCDI Mass Airflow

Utilities Emerg. Vent Reset I/O Return To Test Screen Print Screen

Digital Output

- ☐ System Air Off - 1
- ☐ #6 Nozzle Flow - 4
- ☐ #5 Nozzle Flow - 5
- ☐ #4 Nozzle Flow - 6
- ☐ #3 Nozzle Flow - 7
- ☐ #2 Nozzle Flow - 8
- ☐ #1 Nozzle Flow - 9
- ☐ Engage P3 Low - 18
- ☐ Vent Transducers - 19

622/620 Digital Output Control

- ☐ Rt. Lower Flow Port A - 11
- ☐ Lt. Lower Flow Port C - 12
- ☐ Rt. Upper Flow Port B - 13
- ☐ Lt. Upper Flow Port D - 14

- ☐ Reserved - 2
- ☐ Reserved - 3
- ☐ Reserved - 10
- ☐ Reserved - 15
- ☐ Reserved - 16
- ☐ Reserved - 17
- ☐ Reserved - 20
- ☐ Reserved - 21
- ☐ Reserved - 22
- ☐ Reserved - 23
- ☐ Reserved - 24

Foot Pedal:

Analog In - Scaled Units

Upstream Pressure P1:	<input type="text" value="0.000"/>	Absolute Pressure PB:	<input type="text" value="0.000"/>
Downstream Pressure P2:	<input type="text" value="0.000"/>	Flow Sensor % F1:	<input type="text" value="0.0000"/>
Part Pressure P3:	<input type="text" value="0.000"/>	Upstream Temp. T1:	<input type="text" value="0.000"/>
Probe/Exit Pressure P4:	<input type="text" value="0.000"/>	Part Temperature T3:	<input type="text" value="0.000"/>

E/P Control (Electric / Pressure)

Up/down Voltage Step Size: 1.0

Enter Value: 0-10.000 VDC

Analog I/O Out: In:

Communications Data Buffers:

Diagnostic Screen

From the Diagnostic Screen, you can operate the valves, take pressure measurements, check data-communications, and control output pressure. Very useful for troubleshooting.



620 Front Plate

Detailed Interface User