



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 30 years. The Automatic Airflow Test Stand is now available in the portable Model 620 for easy use and convenience.

A VERSATILE SOLUTION

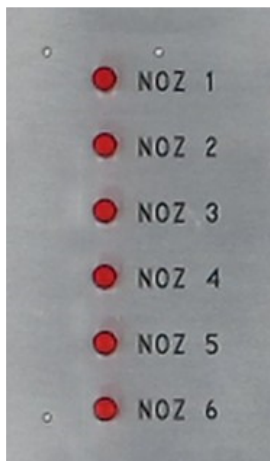
CCDI has been developing Airflow Test Stands since 1976 and automated units since 1986. The years of experience resulted in a refined design of a product that considers the fast-paced nature of the industry. CCDI continues to satisfy customers by adding new test requirements from various turbine manufacturers. Some specifications come from ABB/Alstom Power and related, UTC P&W, P&W Canada, GE Aircraft, GE Power, Honeywell, Allison, Rolls-Royce, Solar Turbines, Snecma, and Siemens.

FEATURES

- Accuracy: +/- 1% Standard (Combination of components can vary uncertainty from 0.35% to 0.7%)
- Repeatability: +/- 0.25% Standard
- Windows Based Software Program V9
- Multiple Manufacturers Test Specs and Formulas
- 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
- Configurations Available: 620EL, 620S, 620L, 620M, 620H, 620XH
- Laboratory Calibrated nozzles with uncertainties available down to 0.15%.

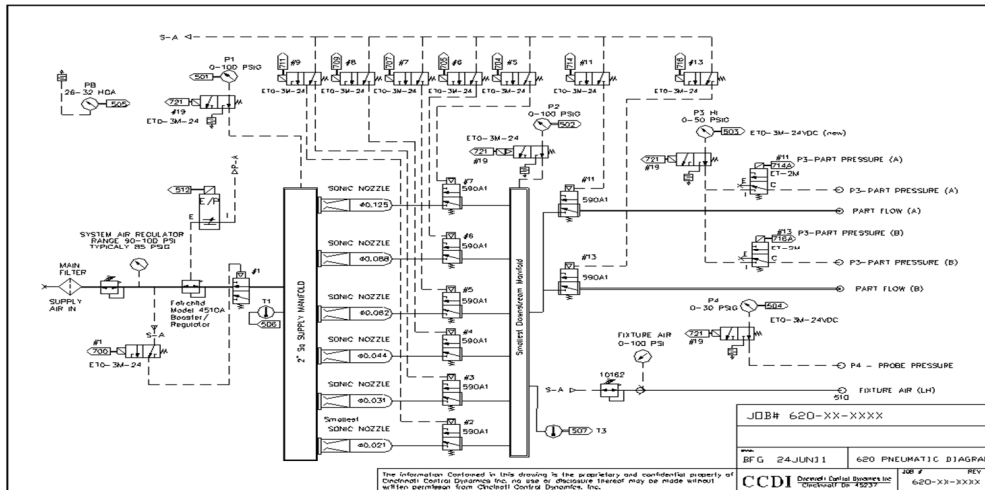
**Model 620 Calibration Ports****Model 620 Flow Ports**

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 +/- 1.00% - Typical Mass Flow Uncertainty: 0.57%

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

GE, P&W, Safran, 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 Pentium Computer, LED Display

Latest version of Windows PRO with Ethernet, 4 USBs

Computer comes with at least 2 RS232 COM ports required for communication and calibration

QC Report, Label, and Data Acquisition File

Free Operator Training, Testing and Certification at CCDI

One-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 approximately 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 $\text{lbs/sec} * \sqrt{\text{Temperature}} / \text{Room Pressure}$
 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
	P3 Low Pressure (option 1)	0-5 PSIG (0-34.47 kPa)	0.10% FS*
	P3 Low Pressure (option 2)	0-1 PSIG (6.895 kPa)	0.10% FS*
	P4 Probe Pressure	0-30 PSIG (0-207 kPa)	0.10% FS*
	P4 Low Pressure (option 1)	0-1 PSIG (0-34.47 kPa)	0.10% FS*
	P4 Low Pressure (option 2)	0-20 Inches Water (4.982 kPa)	0.10% FS*
	PB Barometric Pressure	16-32"HgA	0.10% FS
	T1 Upstream Temp	46-120°F (8 - 49 °C)	+/- 0.5 Deg F
	T1 Downstream Temp	46-120°F (8 - 49 °C)	+/- 0.5 Deg F

*Probe pressure (aka P4), P3Low, P4 Low are 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 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 and Special Commands "DETAIL BOX"

Profile Revision Level: Date Written:

Accept Band: %
☐ Auto Timer: 0 Seconds

☐ Auto Step (at finish) to Next Circuit
☐ Keep air flowing for next flow test
☐ Startup Pressure Delay 0 Seconds
☐ Manual Nozzles: Noz #'s 100
☐ Require Serial Number
☐ Req/Blank Assy Save
☐ Engage P4 Crossover
☐ Force Flow Port: * ☐ Use Secondary E/P
☐ Valve Enable: 00 ☐ Hide Voltage Adjust

Starting FCL: Ending FCL:
 Starting Voltage: 0.000 Starting Press: 0.000 Always Record Setpoint
 User Instructions:
 Test Data In (8.3) Filename: testrec.dat
 Min/Max Decimal Place Override: 0 Decimal Place Override: 0
 Fixture Name: Print Close/Apply
 Master Name:
 Workflow Template Name:

Master Part Limits: When SERIAL#=MASTER

☐ Perform Master Checking ☐ Hourly - Mastering Requirement reset every ho
 R1 Max: 0.0000000 R2 Max: 0.0000000 R3 Max: 0.0000000
 R1 Min: 0.0000000 R2 Min: 0.0000000 R3 Min: 0.0000000

Volume Leak Test
☐ Req. Leak Test: 0.000 PSIG Leak Test Setpt
 Leak Test Time: 0 LK Start Voltage: 0.000 PID ADJ: 0.00
 Fixt Vol: 0.000 Limit (PSIG or 0.000

☐ Require Restriction Test ☐ Require Shutoff Test
☐ Print Label on Save
 Circuit No: 01 - <NEW> Profile Name: TEST.TST

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
- Also functions with an external "Port Expander" which can select multiple gas paths by program control to test multiple flows.

Airflow Setup Version 7.996 620-54-8071

Utilities Configure Calibrate Save Setup Return to Test Screen Edit Passwords Display COM Enabled

Sonic Nozzle K Form p

Nozzle 1 Dia: 0.031
PSIA K

42.001	0.000398381
46.979	0.000398888
49.987	0.000399694
54.969	0.000400202
60.001	0.000400432
64.999	0.000401114
69.935	0.000401678
74.985	0.000401700
84.949	0.000401825
90.005	0.000401950

Date: 03-Jun-22

Tested. By: BFG

Sonic Ratio: 1.50

S/N: 8071-031A

☒ Lab Nozzle

Prev Next Apply

System Configuration SN: 620-54-8071

Max. PSIG Avail: 85.00 Addl. Lk Test Time:(sec) 05

Accept Band %: 0.30 Nozzle Count: 06

PID Reset (sec): 10 Display COM: 0 N/A

Rezero (mins): 0 Acq. COM: 1

Machine Model: 620M Dewp Max Lvl: (deg F) 0.00

Sys Timer (ms): 32 Valve Rot. Time: (sec) 1

Part Recall Reset

System Characteristics Installed Components Calbot COM: 0 N/A

Apply 0=Don't Use

Setup Screen Warnings/Events

☐ Temporarily Disable Auto-Zero

PID: P3 - Nozzle 1 Eff. PID

Prop. Gain:	0.250	0.0
Int. Gain:	0.100	0.0
Der. Gain:	0.010	0.0
Rate: (sec)	0.500	0.0

Prev Next Apply

Instant PID Variables

Active only during tests

Error = Setpt - Meas

Error:

Prev. Error:

Error Sum:

☐ PID Active Pulse

Sensor/Transducer Calib.

P1 Sensor Read

PSIG 0-100 % Meas.

0.000	19.790	C
10.000	27.710	C
20.000	35.630	C
30.000	43.510	C
40.000	51.420	C
50.000	59.330	C
60.000	67.210	C
70.000	75.100	C
85.000	86.910	C
100.000	98.710	C

Date: 02-Jun-22

Cal. By: bfg

S/N: 05202201

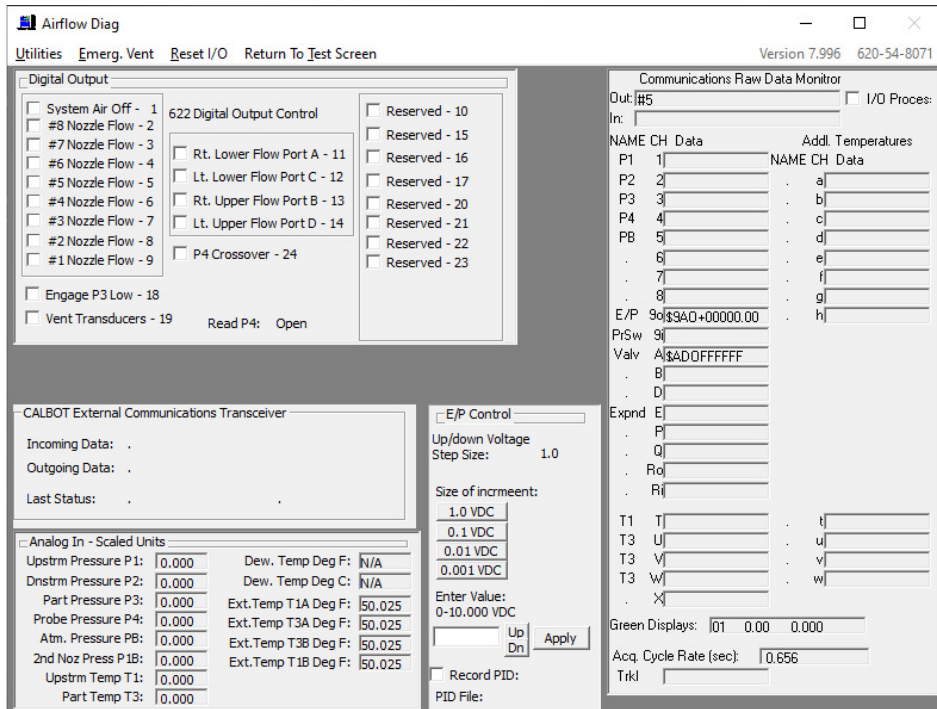
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Transducer and A/D Conv.

☒ Transducer Vent

R-Squared: 0.999999

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



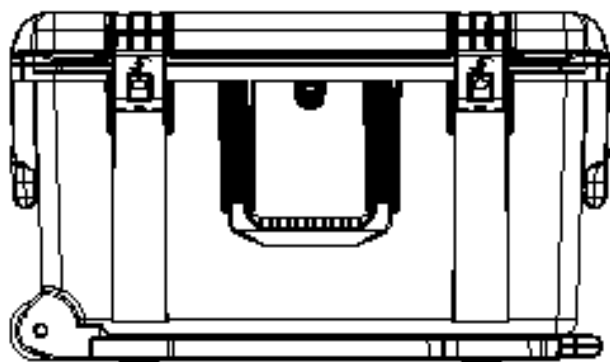
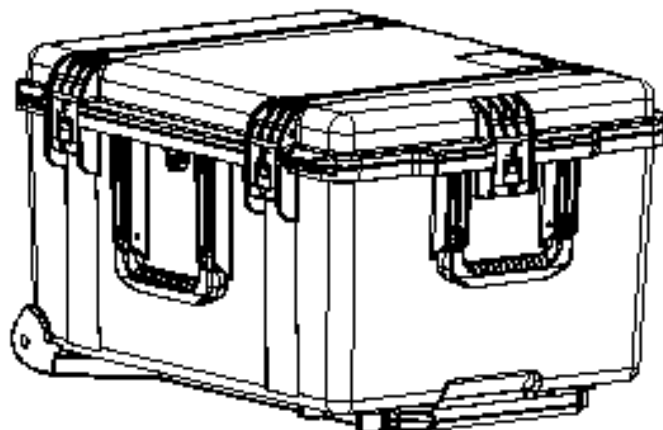
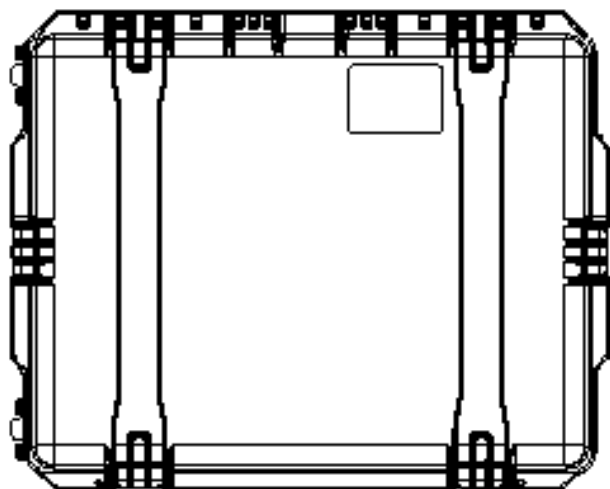
Diagnostic Screen

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

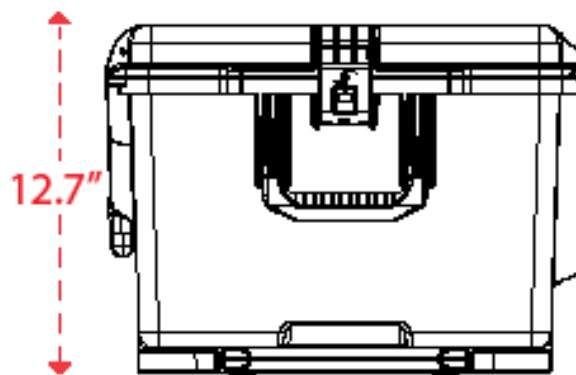


620 Front Plate

Detailed Interface User



←----- 22" -----→



12.7"

←----- 17" -----→