



Sentinel Blackbelt

Benchtop Leak and Flow Test Instrument

Providing world-class leak test and assembly verification solutions to industries around the globe.



Instrument Features

Available Test Types:

- Pressure/Vacuum Decay – Leak Standard
- Pressure/Vacuum Decay - ΔP
- Pressure/Vacuum Decay - $\Delta P/\Delta T$
- Pressure/Vacuum Occlusion
- Pressure Mass Flow
- Pressure Mass Flow – Leak Standard
- Pressure/Vacuum Ramp-to- ΔP Event/Burst
- Pressure/Vacuum Ramp-to-Flow Event/Crack
- Pressure/Vacuum Proof
- Parent Program Linking
- Sequential Program Linking

99 Test Programs:

- Application flexibility including user programmed:
 - Test types
 - Timers
 - Pressure limits
 - Reject limits
 - Calibration parameters
 - Units of measurement
 - Digital I/O
 - Tooling control

Patented Auto Setup:

- Automated optimization of test program based on maximum user allowable cycle time
- Drastically simplifies instrument test programming

Automatic Program Calibration w/Leak Standard

- Tests master production part with internal calibrated leak standard to automatically establish the pressure-loss-over-time (or flow) to leak rate relationship for the part
- Ensures accurate results
- Easy to perform
- Values may be manually edited if averaging of multiple parts is required

Environmental Drift Correction:

- Maintains calibration accuracy by monitoring and automatically making continuous small adjustments for changes in temperature and environmental conditions

Quik Test Function:

- Monitors the instantaneous in-test results and ends the testing process early when it is obvious that a reject or accept result is imminent
- Reduces test time
- Analyzes test results in real time

High Speed 32-bit Processor & 24-Bit A/D Converter:

- Exceptionally fast, high resolution test processing
- Stable yet extremely responsive low pressure/flow measurements

Test Ports:

- Choice of:
 - 1/8" FNPT
 - 1/4" FNPT
 - BSPT adapters for either available
 - Male and Female Luer fittings included

Auto Supply-Shutoff Available

- Saves compressed gasses (typically nitrogen when used for higher pressure applications) when used for leak/flow testing
- Includes a shutoff valve between customer tank and instrument regulator to prevent loss of gas due to naturally bleeding precision pressure



Absolute Pressure Transducers:

- Unlike gauge transducers, environmental conditions (barometric pressure changes) do not impact test results
- Ranges available:
 - Vacuum 5.0 psig
 - Vacuum to 30.0 psig
 - Vacuum to 100.0 psig
 - Vacuum to 200.0 psig
 - Vacuum to 500.0 psig
- Transducer accuracy 0.05% full scale

Mass Flow Transducers:

- Ranges available:
 - 0.5 – 50 scc/m, 2-250 scc/m, 30-3,000 scc/m
 - Many custom ranges available from 10 to 250,000 sccm thermal and differential pressure flow based
- Transducer accuracy 0.5% full scale

Transducer Verification/Recertification:

- Pressure or Flow transducers can easily be performed by user by utilizing available NIST traceable digital pressure gauges and flow standards
 - 6-point standard pressure calibration
 - 5-point standard flow calibration
- Up to 32 point calibration of either transducer type available (menu selectable)

Modular Pneumatic Manifold

- Two versions available:
 - 200 psig max
 - 500 psig max
- CNC machined modules allow optimum repeatability of internal test volume (allows much closer agreement of test results instrument to instrument)
- Unique function modules can be added/removed to facilitate easy instrument modification of pneumatic capabilities as testing needs change

Single or Multiple Sequential Test Ports

- Single, dual, triple and quad test ports available
- Each port has a unique light-ring indicator
- Allows setup for either:
 - Single part with multiple zones
 - Multiple unique parts
- Allows user-controlled pauses between linked tests:
 - Start button with Delay time

Manual or Electronic Pressure Regulation

- High precision pressure control
- Electronic allows automatic adjustment of pressure between tests
 - 20 point regulator range calibration
- Up to max 4 manual regulators available
 - -0.5 to -14.0 psig vacuum
 - 0.2 to 2.0 psig
 - 1.0 to 30.0 psig
 - 2.0 to 100.0 psig
 - 3.0 to 200.0 psig
 - 5.0 to 400.0 psig
- Up to max 2 electronic regulators available
 - -1.0 to -29.0 inHg vacuum
 - 0.1 to 4.0 inHg
 - 0.5 to 15.0 inH2O
 - 0.2 to 2.0 psig
 - 1.0 to 30.0 psig
 - 2.0 to 100.0 psig
 - 3.0 to 200.0 psig
 - 4.0 to 500.0 psig

Auto Supply-Shutoff Available

- Saves compressed gasses (typically nitrogen when used for higher pressure applications) when used for leak/flow testing
- Includes a shutoff valve between customer tank and instrument regulator to prevent loss of gas due to naturally bleeding precision pressure regulators

Internal Vacuum Generator Available

- Compact 2-Stage venturi
- External electric vacuum pumps also available

Units of Measure:

- Time: msec, sec, min, hour
- Pressure: psig, psiv, inH2O, cmH2O, mmH2O, kg/cm2, ATM, inHg, cmHg, mmHg, kPa, Pa, MPa, Bar, mBar, Torr
- Flow: sccm, sccs, scch, slpm, slps, slph, scfm, scfs, scfh
- All of the above selected globally or per test program

Built-In Inputs/Outputs and Tooling Control

- Supplied 24VDC isolated internal power supply exclusively for I/O use (2.5A fused)
- 6 - 24VDC digital inputs (sinking)
- 6 - 24VDC digital outputs (sourcing)
- Tooling control for up to 5 motions with feedback

Leak Standards:

- External (via quick-disconnect port)
- Internal (with calibration valve)
 - Single
 - Dual
- All of the above selected globally or per test program

**Self -Test Functions:**

- Internal leak detection process
- Program calibration verification (when leak standard used)

RS232 Communication Ports:

- 2-Way Telnet communication
- Test result data transmission with selectable fields
- Pressure streaming (20 samples/sec)
- Report transmission
- Barcode unique part identification

Ethernet Port:

- 2-Way Telnet communication w/Email of reports, test data, and alerts
- EtherNet/IP™ Option
26 Inputs/25 Outputs
- Test result data transmission with definable fields
- Test program selection

USB Port:

- Backup/Restore
- Cloning
- Report storage
- Test result data storage & result synchronization (appends data when synchronized USB drive inserted)

Data Management & Storage:

- Up to 5,000 tests stored in on-board memory, expandable through USB port
- Statistic data tracking for trending capability
 - History length
 - Accept %
 - Reject %
 - Accept Average
 - Reject Average
 - Accept Std Deviation
 - Sample Size (since last reset)
- Resettable production counters:
 - Accept
 - Reject
 - Malfunction
- Test result log viewable on display

CTS Connect Actuator Ports Available:

- Up to max 5 - 3-way pneumatic tooling control valves to actuate pneumatic seals or tooling motions

Large 480 x 272 Pixel Full-Color LCD Display

- User-friendly icon-based menus
- Menu operating modes:
 - Basic (simplified)
 - Advanced (detailed)
- Graphing of Pressure or Flow vs. Time with plot position and zoom capability
- Displays active/inactive status of digital inputs & outputs

Digital Inputs:

- Each user configurable for:
 - Start
 - Vent/Halt
 - Stop/Reset
 - Hold
 - SPC Test Part
 - BCD Program Selection (1-31)
 - Program Calibration
 - Part Presence
 - Open Leak Standard
 - External Pressure Switch
 - Tooling Extend Feedback 1-5
 - Tooling Retract Feedback 1-5

Digital Outputs:

- User configurable for:
 - Program Accept
 - Program Reject
 - Malfunction
 - Severe Leak
 - Program Cal Mode
 - Prefill
 - In Fill
 - Fill Valve
 - In Stabilize
 - Isolation Valve
 - In Test
 - In Exhaust
 - In Relax
 - Program Cal Master
 - Program Cal Leak Standard
 - Test Passed
 - Test Failed
 - Below Low Limit
 - Between Limits
 - Above High Limit
 - Tooling Extend 1-5
 - Tooling Retract 1-5
 - Pressure Select

3-Color Light-Ring Indicator:

- Unique indicator per test port provides clear feedback of test results
- Colors:
 - White: In Test
 - Green: Accept
 - Red: Reject
- Brightness menu adjustable in 20% increments
- Duration menu adjustable:
 - Always On
 - Always Off
 - 3-Sec Accept/Reject

Key or Password Security:

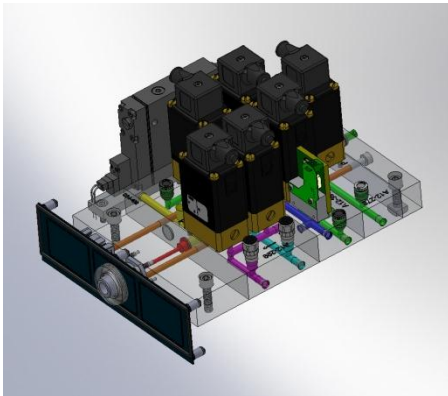
- User selection of menu items to secure or unsecure
 - Calibration
 - Program Selection
 - Program Configuration
 - Instrument Configuration
 - Clear Test Data
 - Clear Counters
 - Hold Function
 - Reject Release
 - Monitor Screens

Multiple Menu Languages:

- User selectable:
 - English
 - Spanish
 - Chinese
 - Korean

Help Menus:

- On-screen popup window description of parameters (activated by single shortcut key)
- Minimizes need to have the equipment manual present when programming the instrument



Audible Alarm

- For faults and reject result tests
- Volume menu adjustable in 20% increments.

Compact Benchtop Design:

- Dimensions: 11.25" high x 9" wide x 15" deep (285 mm high x 230 mm wide x 380 mm deep)
- Weight : Up to 40 lbs (configuration dependant)

Input Requirements:

- Electrical: 90-260VAC, 50/60 Hz
- Pneumatic:
 - Pressure Input = 20 psig above maximum test pressure, clean dry compressed air or nitrogen
 - Pilot Input (if required) = 90 psig, clean dry compressed air or nitrogen

Ambient Operating Conditions:

- Temperature: 41 to 109°F (5 to 40°C)
- Humidity: 90% (non condensing)

