Sentinel Blackbelt®

LEAK AND FLOW TEST INSTRUMENT

Highlights

- ✓ Pressure decay, mass flow, and differential pressure decay test types
- ✓ Program calibration with CTS Performance Factor Feedback for accuracy monitoring
- ✓ RS232, TCP/IP, EtherNet/IP™ and PROFINET
- ✓ Auto program setup
- ✓ Parent program linking
- ✓ Program calibration
- ✓ Global friendly control interface
- ✓ 1-4 sequential test port

Description

The Sentinel Blackbelt is an advanced multi-functional leak and flow test instrument delivering high resolution measurement. This instrument is available in three configurable benchtop models:

- Pressure decay
- Mass flow
- Differential pressure decay

Blackbelt Specifications	
Instrument housing	Blackbelt benchtop configuration 9.2" w x 11.3" h x 15.3" d (233 mm w x 287 mm h x 388 mm d)
Electrical	100-240 VAC, 50/60 Hz
Air quality	ISO 8573-1:2010 [2:2:2] Compressed air or nitrogen only
Pilot	60 psig (4.1 bar) min, 110 psig max
Operating temperature	41-104° F (5-40° C)
Operating humidity	90% non-condensing
Digital I/O	12 inputs and 12 outputs, 24 V - 1 A max. Tooling control up to 8 motions with feedback
Instrument weight	30-45 lbs (13.6-20.4 Kg)

Sentinel Blackbelt Pressure Decay Features

Pressure decay leak testing is the measurement of pressure loss over time. The use of an absolute pressure transducer increases the accuracy of the test by measuring the pressure relative to a sealed vacuum reference, eliminating barometric pressure change issues.

PRESSURE DECAY TEST TYPES

- Pressure/Vacuum decay - leak standard
- Pressure/Vacuum decay - ΔP
- Pressure/Vacuum decay - ΔP/ΔT
- Occlusion - pressure or vacuum
- Ramp to proof - pressure
- Pressure verify

MEASUREMENT RESOLUTION

- **Test pressure / pressure loss**

  Displayed resolution: Range is selectable X - X.XXXXXX displayed units during pre-fill, fill, stabilize, test, and exhaust

  Transducer options:

Range	Measurement	Resolution
0-20 psia	-14.7 to 5 psig	0.000004 psig
0-45 psia	-14.7 to 30 psig	0.000008 psig
0-115 psia	-14.7 to 100 psig	0.000021 psig
0-215 psia	-14.7 to 200 psig	0.000040 psig
0-515 psia	-14.7 to 500 psig	0.000096 psig

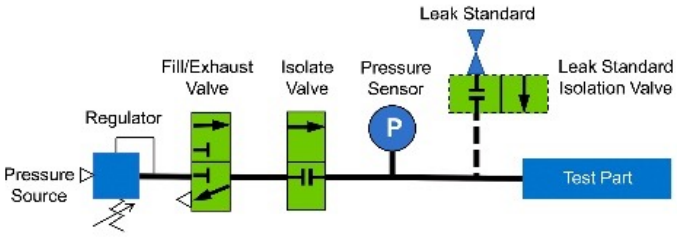
- **Leak rate**

  Displayed resolution:
  Range is selectable X - X.XXXXX displayed
  Instrument resolution: 0.0005 scc/min

LEAK STANDARD

External leak connection available

Pressure Decay Test Circuit



PRESSURE REGULATORS

- Mechanical regulators maximum: 4
- Venturi Vacuum Source: 0.5 to 12.7 psiv (1-26 inHG vacuum)
- Mechanical regulator options:
  0.2 to 2.5 psiv (0.5-5 inHG)
  0.5 to 12.7 psiv (1-26 inHG)
  2.5 to 14.5 psiv (5-29 inHG)
  0.2 to 2.0 psig
  0.5 to 10.0 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
  10.0 to 500.0 psig
- Electronic regulator maximum: 2
- Electronic regulator options:
  0.5 to 14.5 psiv (1-29.0 inHg)
  0.5 to 2.0 psiv (0.1-4 inHG)
  0.02 to 0.5 psig (0.5-15 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

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

PATENTED AUTO TEST SETUP

- Automated optimization of test program based on maximum user allowable cycle time
- Simplifies instrument test programming and setup

Sentinel Blackbelt Mass Flow Features

Flow meter measures the amount of air required to maintain test pressure over time.

MASS FLOW TEST TYPES

- Mass flow
- Mass flow - leak standard

MEASUREMENT RESOLUTION

- **Test pressure**

  Displayed resolution: Range is selectable X - X.XXXXXX displayed units during pre-fill, fill, stabilize, test, and exhaust

  Transducer options:

Range	Measurement	Resolution
0-20 psia	-14.7 to 5 psig	0.000004 psig
0-45 psia	-14.7 to 30 psig	0.000008 psig
0-115 psia	-14.7 to 100 psig	0.000021 psig

- **Flow**

  Transducer range:
  0.2-20 scc/min
  0.5-50 scc/min
  2-250 scc/min
  5-500 scc/min
  10-1,000 scc/min
  30-3,000 scc/min
  100-10,000 scc/min
  Other ranges available (consult factory)

- **Leak rate**

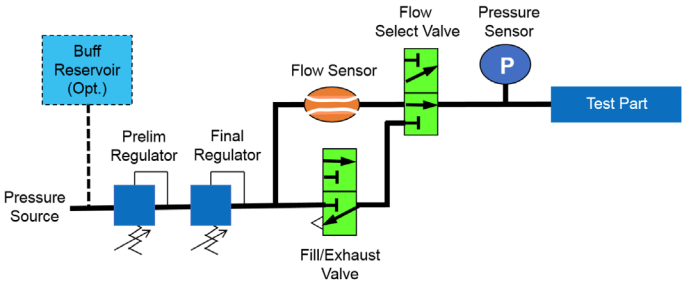
  Displayed resolution:
  Range is selectable X - X.XXXXX displayed units

LEAK STANDARD

External leak connection available

PRESSURE REGULATOR

- Instrument maximum: 2
- Mechanical regulator options:
  0.2 to 2.5 psiv (0.5-5 inHG)
  2.5 to 14.5 psiv (5-29 inHG)
  0.2 to 2.0 psig
  0.5 to 10.0 psig
  1.0 to 30.0 psig
  2.0 to 100.0 psig
  Other ranges available (consult factory)



Sentinel Blackbelt Differential Pressure Features

Differential pressure decay leak testing is the measurement of pressure loss over time by comparing the pressure difference between a reference volume and a test part volume.

DIFFERENTIAL PRESSURE DECAY TEST TYPES

- DP pressure/vacuum decay - leak standard
- DP pressure/vacuum decay - ΔP
- DP pressure/vacuum decay - leak rate
- Occlusion – pressure or vacuum

MEASUREMENT RESOLUTION

- **Test pressure**

  Displayed resolution: Range is selectable X - X.XXXXXX displayed units during pre-fill, fill, and exhaust

  Transducer options:

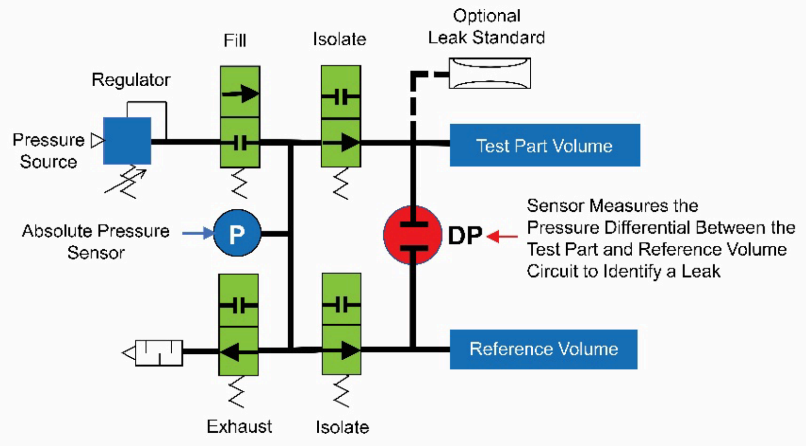
Range	Measurement	Resolution
0-20 psia	-14.7 to 5 psig	0.000004 psig
0-45 psia	-14.7 to 30 psig	0.000008 psig
0-115 psia	-14.7 to 100 psig	0.000021 psig
0-215 psia	-14.7 to 200 psig	0.000040 psig

- **Differential pressure**

  Displayed resolution:
  Range is selectable X - X.XXXXX displayed units
  Instrument resolution: 0.000001 psig (0.007 Pa)

- **Leak rate**

  Displayed resolution:
  Range is selectable X - X.XXXXX displayed units
  Instrument resolution: 0.00005 scc/min



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  0.2 to 2.0 psig
  0.5 to 10.0 psig
  1.0 to 30.0 psig
  2.0 to 100.0 psig
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  0.02 to 0.5 psig (0.5-15 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

LEAK STANDARD OPTIONS

- External leak standard optional

Sentinel Blackbelt Features

99 TEST PROGRAMS

- Program selection and flexibility
- Pressure, flow, and vacuum test types
- Timers
- Pressure limits
- Reject limits
- Calibration parameters
- Units of measurement
- Digital I/O
- Tooling control

PATENTED AUTO TEST SETUP

- Automated optimization of test program based on maximum user allowable cycle time
- Simplifies instrument test programming and setup

DATA MANAGEMENT AND STORAGE

- 30,000 tests stored in on-board memory
- Expandable memory through USB port
- Statistic data tracking for static 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

PARENT PROGRAM LINKING

- A test type that allows the results of individual tests to be grouped together and report a global or "parent test" result
- Allows linking of individual test programs to test in sequence for overall control of tooling, cycle inputs, and program result outputs for the test sequence

ENVIRONMENTAL DRIFT CORRECTION

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

SELF-TEST FUNCTIONS

- Self-leak detection process
- Program calibration verification (when a leak standard is used)

AUTOMATIC CALIBRATION

- An easy to perform routine that calibrates the instrument to a “master part“
- Batch calibration to average over multiple parts, if required
- Permits manual edits of calibration data

TEST PRESSURE COMPENSATION

Compares programmed test pressure to actual test pressure and correlates a comparative measurement for the leak test to maintain accuracy

HIGH-SPEED 32-BIT PROCESSOR AND 24-BIT A/D CONVERTER

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

UNITS OF MEASURE

- Pressure: ATM, Bar, cmHg, inHg, kPa, Mpa, mBar, mmHg, Pa, Torr, psia, psig, psiv, mmWC, iWC, cmWC, ksc
- Flow: sccm, sccs, scch, slpm, slps, slph, scfm, scfs, scfh
- Time: msec, sec, min
- All of the above selected globally or per test program

TEST PORTS

- 1 concurrent test port, standard
- 2, 3, and 4 test ports available for sequential or zone specific testing
- 1/4” and 1/8" FNPT test port
- Metric and BSPT Adapters
- Other connection sizes available (consult factory)

VACUUM SOURCE GENERATION

- 2-stage internal venturi vacuum generator
- External electronic vacuum pump available

Sentinel Blackbelt Features (Cont'd)

DIGITAL INPUTS/OUTPUTS

- 12 user configurable inputs
- 12 user configurable outputs
- Tooling control for up to 8 tooling motions with feedback

RS232 COMMUNICATION PORT

- 2-way communication
- Test result data transmission with definable fields
- Pressure streaming for waveform analysis
- Generated reports with test data and configuration
- Barcode input for unique part identification

ETHERNET PORT

- Telnet 2-way communication (same features as RS232 communication)
- Email of reports, test data, and alerts
- EtherNet/IP™ or PROFINET providing instrument control, test result data, and additional user configurable 12 inputs / 12 outputs
- CTSnet capable for remote control and configuration
- QualityWorX communication for waveform and result analysis

EXTERNAL USB PORT

- Provides additional program storage capacity and synchronized test result data storage
- Backup/restore of instrument functions
- Report storage
- Test result data storage and automated result synchronization

COMPACT ENCLOSURE DESIGN

Communication connections, air supply, pressure regulators and pneumatic tooling outputs located in the back, test ports and optional leak ports in the front of unit

REMOTE INSTRUMENT MANAGEMENT WITH CTSNET LT SOFTWARE

- PC software included with every Sentinel Blackbelt
- Monitor and control instrument
- Configure programs
- View data and export reports

FULL-COLOR LCD DISPLAY

- 480 x 272 pixels
- User-friendly icon-based menus
- Menu operating modes: Basic, Advanced, Admin
- Graphing of pressure or flow vs. time with plot position and zoom capability
- Displays active/inactive status of digital inputs and outputs

SELECTABLE MENU LANGUAGES

- Language neutral operator interface
- English, Spanish, Chinese, Korean, Portuguese, and German language options

3-COLOR LIGHT RING FEATURE

- Panel mount light indicators provide visual feedback of test results
- White = In-Test, Green = Accept, and Red = Reject
- Eliminates stack lights
- Adjustable brightness
- Adjustable duration

SECURITY

- Protect menu items via password or keylock

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

TOOLING CONTROL

- 1-8 Internal optional pneumatic drivers available

FILL/EXHAUST CONTROL

- Controlled fill pre-fill options
- Controlled exhaust options

AUDIBLE ALARM

- Configurable for fault and reject test results
- Adjustable volume

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Instrument Detail

Blackbelt Instrument Display

Start/Pause Button,
Program Select Buttons +/-

Stop/Reset Button

Test Ports 1-4
External Leak Std Port Option

Monitor Selection Button,
Exit Button,
Enter and Navigation Buttons,
USB Button,
Information Detail Button

USB Port,
Keyed Reset/Unlock Switch

Pressure Sources 1 & 2

Available Pressure Sources 3 & 4

Ethernet Port and
RS232/Barcode input

Power Cord Connector/Switch
and Input/Output Ports

Exhaust A & B,
Fixed Charge Fill,
CTS Connect Actuation 1-8

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