

Sentinel® Blackbelt Pro

Benchtop and Wallmount Configurations



Highlights

- Pressure decay, vacuum decay, mass flow and ramping tests
- Program calibration with CTS Performance Factor Feedback for accuracy monitoring
- RS232, TCP/IP, EtherNet/IP™ communications
- Program linking
- Program calibration
- Touch Screen interface

Description

The Sentinel Blackbelt Pro™ is an advanced multi-channel test instrument for leak, flow pressure and vacuum testing. One Blackbelt Pro instrument can manage and execute 4 individual part tests with 4 independent test channels. Its operation may be conducted either asynchronously or simultaneously, offering a lot of time savings during a testing operation of multiple stations.

MULTI-CHANNEL INSTRUMENT

- 1 to 4 independent pressure decay leak tests
- 1 to 4 independent flow tests
- Multiple tests per port

Note: A mass flow circuit will also conduct a pressure decay leak test

Blackbelt Pro Specifications

Wallmount Instrument Housing	16.25" wide x 13.5" height x 10" deep
Benchtop Instrument Housing	10.8" wide x 12.9" height x 21.7" deep
Electrical	88-264 VAC, 47/63 Hz
Air Quality	ISO 8573-1:2010 [2:2:2]
Pilot Air	60 psig (4.1 bar) minimum
Operating Temperature	5°C to 40° C (41°F to 104°F)
Operating Humidity	90% relative humidity, non-condensing
Digital I/O	18 inputs and 18 outputs, 1 Amp, 5+ tooling control motions w/feedback (total dependent upon available I/O)
Instrument Weight	45-60 lbs (20-27 kg), dependent upon selected configuration

Sentinel Blackbelt Pro Pressure Decay Features

Pressure decay leak testing is the measurement of pressure loss over time. The use of absolute pressure transducers 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 and Vacuum Testing:

- Pressure decay - ΔP
- Pressure decay over time - $\Delta P/\Delta T$
- Pressure decay leak standard
- Occlusion (blockage)
- Pressure verify
- Ramp to pressure event
- Ramp to input event
- Ramp to proof

LEAK RATE

Displayed resolution:

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

MEASUREMENT RESOLUTION

- **Test pressure / pressure loss**

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

ABSOLUTE PRESSURE TRANSDUCER

- Eliminates test variations from barometric pressure changes
- Uncertainty 0.05% full scale (all ranges)

TRANSDUCER OPTIONS

Range	Measurement	Resolution
0-20 psia	-14.5 to 5 psig	0.000004 psig
0-45 psia	1 to 30 psig	0.000008 psig
0-115 psia	1 to 100 psig	0.000021 psig
0-215 psia	2 to 200 psig	0.000040 psig
0-515 psia	5 to 500 psig	0.000096 psig

PRESSURE REGULATORS

- Vacuum Generator option: Venturi Vacuum Source:
0.5 to 12.7 psiv (1-26 inHG vacuum)
- Mechanical regulator options maximum: 4
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
3.0 to 200.0 psig
10.0 to 500.0 psig
- Electronic regulator maximum: 4
- 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
4.0 to 500.0 psig

LEAK STANDARD

- External leak connection - Benchtop Unit
- External or Internal leak connection - Wall mount Unit

Sentinel Blackbelt Pro 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

PRESSURE REGULATOR

- Instrument maximum: 4
- 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)

Pressure Transducer Ranges

- 0-20 psia, -14.7 to 5 psig, 0.000004
- 0-45 psia, 1-30 psig, 0.000008
- 0-115 psia, 1-100 psig, 0.000021

Flow

Transducer range:

- 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
- Uncertainty - 0.5% full scale (all ranges)

Sentinel Blackbelt Pro Features

PROGRAM SELECTIONS AND FLEXIBILITY

- 999 Test Programs
- 100,000 selectable tests with up to - 100 tests per program
- Pressure, vacuum, and flow test types
- Timers
- Pressure limits
- Reject limits
- Test calibration parameters
- Units of measurement
- Digital I/O
- Tooling control
- Data communication

SMART KEY™ OR PASSWORD SECURITY

- 250 unique User ID/Passwords or Smart Key
- Security features may be customized for each user.

QUIK TEST FUNCTION

- Shortens test cycle when it is obvious and imminent the monitored pressure curve will result in a reject or accept
- Analyzes test results in real time
- Provides projected final test results

DATA MANAGEMENT & STORAGE:

- 1,000,000 tests stored on internal memory
- Infinite - Expandable Storage Via USB
- Test Results Including Malfunction
- Data Viewable on Display

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

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

TRANSDUCER VERIFICATION/RECERTIFICATION

- Pressure and flow transducers
- 6 point standard flow calibration
- 6-point standard pressure calibration

AUTOMATIC TEST CALIBRATION

- Easy to perform
- Permits manual edits if averaging multiple parts is required
- Calibrates to master part

SELF -TEST FUNCTIONS:

- Internal leak detection process
- Program calibration verification

ENVIRONMENTAL DRIFT CORRECTION

- Automatically maintains calibration accuracy to compensate for changes in environmental conditions including temperature

UNITS OF MEASURE

- All standard industrial units of measure are easily selectable per part program
- 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

INDEPENDENT AND CONCURRENT TEST CHANNELS

- 1, 2, 3, or 4 ports
- Optional 1/8", 1/4" FNPT, Male or Female Luer
- Contact CTS for other size options

AVAILABLE PNEUMATIC MANIFOLDS

- Standard flow
- Low volume
- High flow
- Enhanced high flow option
- Internal vacuum generator option

Sentinel Blackbelt Pro Features (Cont'd)

PRESSURE CONTROL

- Standard high precision manual regulators
- High flow, precision manual regulators for mass flow
- Select up to two precision electronic regulators for automatic pressure changes, unique to each test port
- 20 point e-regulator calibration

LEAK STANDARDS

- Internal leak standard on the manifold
- Optional external leak standard port

24 VOLT DIGITAL INPUTS/OUTPUTS

- 18 User configurable inputs
- 18 User configurable outputs
- Tooling control – five or more tooling motions with feedback
(limit based on available I/O) - eliminates the need for a PLC in many cases

PNEUMATIC SEAL ACTUATION

- 8 Outputs; easily actuate independent CTS Connect pneumatic seal devices

TCP/IP AND RS232 COMMUNICATION PORTS

- 2-Way Telnet communication
- Test result data transmission with definable fields
- Pressure streaming for curve storage
- Email of reports, test data, and alerts

ETHERNET PORT

- 2-Way Telnet communication w/Email of reports, test data, and alerts
- EtherNet/IP™ Option Additional 50 Inputs/53 Outputs (digital)
- Test result data transmission with definable fields
- Test Program Selection

USB PORT

- Backup/Restore
- Cloning
- Report storage
- Test result data storage & result synchronization

TOUCH SCREEN INTERFACE

- 9" LCD, 800 x 480 color touchscreen

ONSCREEN STATUS AND TEST INDICATOR:

- Onscreen status and color illumination provides clear feedback of each test
- Eliminates stack lights
- Adjustable brightness

BENCHTOP DESIGN ONLY

- 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
- Audible Alarm:
Configurable for fault and reject test results
Adjustable volume

LANGUAGE NEUTRAL KEYPAD WITH HELP BUTTON

- On-screen popup help window
- Minimizes dependency on the manual

SELECTABLE MENU LANGUAGES

- Language neutral operator interface
- English, Spanish, Chinese