

Sentinel I-24 Leak Test Instrument Specification Sheet

- **Unique Auto Test Setup**
- **Multiple Test Capabilities**
- **Sequential Test Linking**
- **USB, RS232, Ethernet**
- **Store Bar Code with Test Data**
- **Integral Multi-Action Tooling Control**

Versatile Test Capabilities

Pressure (Vacuum) Decay Leak Rate
 Pressure (Vacuum) Drop
 Pressure Rate of Change
 Occlusion (Back Pressure)
 Differential Pressure Decay Leak Rate
 Mass Flow
 Differential Mass Flow Leak Rate
 Sequential Pressure Decay and Mass Flow

Instrument Flexibility accommodates:

- different test pneumatics,
- performs various test methods,
- accepts different part-to-part test parameters,
- allows test specific units of measurement,
- varies input/output and tooling control options to match the part,
- utilizes a variety of communications methods to interface to the factory network.

99 Part Programs with Application

Flexibility includes test type, timers, pressure parameters, leak rates, calibration parameters, units of measurement, tooling control, and input/output selection.

Auto Setup automatically determines optimal test cycle times to meet desired total cycle time requirements for leak rate tests.

Auto Calibration routine 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.



Environmental Drift Correction maintains calibration accuracy by monitoring and automatically making continuous small adjustments for changes in temperature and environmental conditions.

Quik Test monitors the instantaneous in-test results and ends the testing process early when it is obvious that a reject or accept result is imminent.

Self Test Functions include internal pneumatic leak check, calibration verification, transducer zero and span calibration, and test regulator adjustment (electronic regulator calibration)

Compact Modular Enclosure for easy installation and maintenance (includes all electronics and pneumatics) in two basic configurations for application flexibility

Shelf /Table mount: 14.3”w 8.4”h x 14.9”d

Wall mount: 13.5”h x 11”w x 8.7”d

Custom Wall mount: 16”h x 12”w x 9”d
20”h x 16”w x 9”d

Modular Pneumatics with manifold mounted valves, transducer(s), calibrated leak standard(s), where applicable, and regulator(s).

Transducers

Absolute Pressure Transducer:

Monitors test pressures for all tests and displays pressure relative to atmosphere (gage pressure) or pressure loss or rate of loss during standard pressure/vacuum decay tests.

Differential Pressure Transducer:

Monitors differential pressure decay during test for differential pressure decay instruments.

Mass flow transducer: Measures mass flow during test for all mass flow test instruments.

High resolution 24 bit A/D converter and patent pending signal conditioning for fast, repeatable test results (resolution to 0.00001% of the transducer full scale)

Electronic Regulator Option provides automatic pressure selection for multiple pressure tests and sequential pressure decay/mass flow/pressure drop/occlusion tests with single regulator pneumatics.

High speed, powerful computer with 32 bit processor for fast, high resolution processing.

Monitoring and Programming via integral operator panel or remote computer. Remote part program selection using Binary digital inputs (1 to 7 digital inputs), RS232, or Ethernet..

Operator Display Panel makes operator interface simple, fast and comprehensive

- **Highly visible VFD display** with bar graph test results, digital test results, test parameters, counters, and test statistics
- **Test result lights** for Part Accept/Reject
- **Keypad with Function and Display keys** for Auto Setup, Change Part, Auto Calibrate, Part Configuration, Instrument Configuration, Self Test, Start, Stop, Test Data, Monitor, and Help

High Speed Communication via RS232 and Ethernet includes test parameters, test results, counter information, and test statistics at baud rates up to 115200 for RS232. Test result output formats are selectable

Barcode data display and storage of up to 32 alpha-numeric characters with each completed test via RS232 from barcode reader or PLC.

Pressure Streaming - Test data output every 0.1 seconds via RS232 for plotting test curves.

Data Collection stores test results of leak/flow rates, pressure loss, test pressure, time, date, barcode, and more for over 5,000 tests.

USB Data Storage and Backup

Front panel mounted connection makes it easy to download instrument information or restore/upload instrument setup. Easily download test parameters, test results, and counter information. Upload instrument firmware, test parameters, and flow transducer calibration data.

Comprehensive Tooling Control for simple and complex applications includes simple pneumatic seal output for operator safe automatic seal or up to five sequential digital outputs with digital input feedback for extend and retract motions combined with one or two input start (anti-tie), part presence before start or after tooling motion, and part accept/reject part mark. Easy setup performed within each part program.

Standard Integral 12 Input / 8 Output

Digital Interface. These inputs and outputs are independently programmable within each individual part program.

Programmable Digital Inputs include 1-2 Start, Stop/release, Open Leak Std Valve, Part Presence, Ext. Switch feedback (before end of fill timer), Auto Cal, Hold, Vent/Halt, SPC Test Part, 1-5 Tooling Extend feedback, 1-5 Tooling Retract feedback, Part Mark feedback, and 1-7 Binary Part Select.

Programmable Digital Outputs include Test Accept/Reject per test, Part Accept/Reject, Outputs per test reject limits, Outputs for steps of test sequence, 1-5 Tooling Extend, 1-5 Tooling Retract, Part Accept/Reject Mark, In Auto Cal sequences, Test lamp, and Press Select.

Specifications

Pneumatic Manifold Options for Test Types

Test Type P - Pressure Test

Pressure Decay Leak Rate, Pressure Drop, Rate of Change, and Occlusion Tests

Single Regulator* / Absolute Pressure Transducer / Single Leak Standard

- **N Manifold** - Low volume (<1 cc), Low Cv Valves
 - Pressure ranges: 10 psiv to 100 psig
- **A Manifold** - Standard Cv valves (1/8" orifice), Internal volume (8 cc)
 - Pressure ranges: 14.7 psiv to 100 psig
- **B Manifold** – High flow-high Cv valves (5X flow), Internal volume (12cc)
 - Pressure ranges: 14.7 psiv to 200 psig
- **J Manifold** – High pressure-high Cv valves, Internal volume (12 cc)
 - Pressure range: Up to 500 psi

Dual Regulators / One or Two Absolute Pressure Transducers / Two Leak Standards

- **C Manifold** – Standard Cv valves (1/8" orifice), Single transducer, Internal volume (6 cc)
 - Pressure range: 14.7 psiv to 200 psig (Maximum 75 psig when combined with vacuum)
- **D Manifold** – Standard Cv valves (1/8" orifice), Two transducers, Internal volume (6 cc)
 - Pressure range: 14.7 psiv to 200 psig (Maximum 75 psig when combined with vacuum)

Test Type D - Differential Pressure Decay Differential Pressure Decay Leak Rate, Pressure Decay Leak Rate, Pressure Drop, Rate of Change, and Occlusion Tests

Single Regulator / Differential Pressure Transducer / Absolute Pressure Transducer / Single Leak Standard

- **G Manifold** – High flow-high Cv valves, Internal volume (12cc)
 - Pressure range: 200 psig
 - Differential pressure range: 2 psid

Test Type F – Direct Mass Flow Test

Tandem Regulators / Mass Flow Transducer / Absolute Pressure Transducer

- **E Manifold** – High Cv valves, Internal volume (12cc)
 - Pressure range: 0 to 100 psig
 - Flow ranges: 0-1000, 0-6000 sccm
 - Custom pressure ranges: Vacuum to 200 psig
 - Custom flow ranges: 10 to 100,000 sccm

Test Type A – Differential Mass Flow Differential Mass flow, Direct Mass Flow, Pressure Decay Leak Rate, Pressure Drop, Rate of Change, and Occlusion Tests

Single Regulator / Mass Flow Transducer / Absolute Pressure Transducer / Single Leak Standard

- **F Manifold** – High Cv valves, Internal volume (12cc)
 - Pressure Ranges: 0 to 100 psig
 - Flow: 0-1000, 0-6000 sccm

Test Type N – Sequential Pressure Decay and Direct Mass Flow Test

Pressure Decay Leak Rate, Pressure Drop, Rate of Change, Occlusion, Direct Mass Flow, Sequential Pressure Decay/Mass Flow Tests
Single or Dual Tandem Regulator Sets / Mass Flow Transducer / Absolute Pressure Transducer/ Single Leak Standard

- **K Manifold** – High Cv valves (5X flow), Single tandem regulator set, Internal volume (12cc)
 - Pressure ranges 0 – 100 psig
 - Flow ranges 0-1000, 0-6000 sccm
 - Custom ranges: 14.7 psiv to 200 psig
 - Custom Flow ranges – 10 to 100,000 sccm
 - **L Manifold**[^] – Standard Cv valves, Single tandem regulator set, Internal volume (6 cc)
 - Pressure ranges – 0 to 100 psig
 - Flow ranges – 0-1000, 0- 6000 sccm
 - Custom ranges: 14.7 psiv to 200 psig
 - Custom Flow ranges – 10 to 100,000 sccm
 - **M Manifold**[^] – Standard Cv valves (1/8” orifice, Two tandem regulator sets, Internal volume (6 cc)
 - Pressure ranges – 1 to 100 psig
 - Flow ranges – 0-1000, 0- 6000 sccm
 - Custom ranges: 14.7 psiv to 200 psig
 - Custom Flow ranges – 10 to 100,000 sccm
- [^] requires medium custom enclosure

Transducer Resolution

- **Mass Flow Transducer**
 - Displayed Flow Resolution: 0.001 units
- **Absolute Pressure Transducer**
 - Displayed Pressure Resolution: 0.001 units during pre-fill, fill, and stabilize
 - Displayed Resolution of pressure loss during test: 0.00001 units
 - Absolute Pressure Resolution: 0.00005% of transducer range (0.3 pa for 200 psi range)
- **Differential Pressure Transducer**
 - Span: 2 psi
 - Test pressure resolution: 0.0000002 psi (0.001 Pa)
 - Displayed resolution in test: 0.00001 units

I/O Board Power Requirements

- Supplied independent of instrument power
- 120 VAC or 24 VDC fused for 6.3 amp total

Control inputs are sinking

- 12 TTL inputs

Control outputs are sourcing

- 8 solid-state relays

Input/Output Terminals

- Integral 12 inputs and 8 outputs are available within the enclosure.
- Input and output functions per terminal are assigned within the part programs

Inputs include:

Start	Stop/release
Common	Part presence
Hold	Halt/Vent
Ext Press Sw*	Auto Cal
Open Leak Std	SPC Test Part
Binary part select (1-7)	
Tool Mot 1-5 extend feedback	
Tool Mot 1-5 retract feedback	
Part mark feedback	

Outputs include:

Part Accept	Part Rejesct
Malfunction	Severe Leak
AutoCal Mode	AutoCal LS
AutoCal Master	Test Lamp
Ext Sw feedback*	Press Select*
In Pre-fill timer*	In fill timer*
In stab timer*	In test timer*
In Exh timer*	In Relax
Test passed*	Test failed*
Below LL*	Above HL*
Betw Lim*	
Accept Mark	Reject Mark
Tool Mot 1-5 extend	
Tool Mot 1-5 retract	

**Additional input and outputs available for test 1 and 2 for dual test types*

Instrument Power Requirements

- 120 VAC - 6 amps;
- 230 VAC - 6 amps,
- 24 VDC - 6 amps

Part Program Storage

- Up to 99 part programs

Calibration System

- NIST traceable calibrated leak standard sized to within +5%/-0% of specified reject rate with an accuracy of +/-1.2% of value. Mounted directly to pneumatic manifold

Communication: Two-way

- TCP/IP (Ethernet – telnet and email)
- Four portals via one internal connection on communication board
- RS232 One (on front of operator panel for external connection)
- RS232 Two (internal connection on communication board)
- 115600, 57800, 33600, 19200, or 9600 baud rate
- no parity, 8 bits, 1 stop bit, no flow control

USB memory chip (Formatted Fat32):

- Data up-load & down-load

Enclosures:

Nema 12 Industrial Enclosure

Die cast aluminum

Dimensions: 11”W x 13.5”H x 8.7”D

Weight: 26.5 lbs

Bench Top Enclosure

Dimensions: 14.3”W x 8.4”H x 14.9”D

Weight: 18 lbs

Custom Enclosures

Dimensions: 12”W x 16”H x 9” D

16”W x 20”H x 9”D

Ambient conditions: 5 to 40 C (41 to 109 F)

Humidity: 90% non-condensing

Instrument Option Selection

	Test Capability Desired
	Pressure Decay/Pressure Drop/Rate of Drop Test with One Regulator and One Calibrated Leak Standard
	Dual Sequential Pressure Decay/Pressure Drop/Rate of Drop Tests with One or Two Transducers and Two Calibrated Leak Standards
	Differential Pressure Decay Test/Pressure Decay/Pressure Drop/Rate of Drop with One Regulator and One Calibrated Leak Standard
	Direct Mass Flow Test with Two Tandem Regulators
	Differential Mass Flow/Direct Mass Flow/Pressure Decay/Pressure Drop/Rate of Drop Test with One Regulator and One Calibrated Leak Standard
	Combination Mass Flow/Pressure Decay Leak Tests with One Regulator and One Calibrated Leak Standard
	Dual Pressure Sequential Combination Mass Flow/Pressure Decay Leak Test with Two Regulators and One Calibrated Leak Standard

	Test pressure range
	Vacuum (0 to 14.7 psiv)
	0 – 2 psig
	0 – 5 psig
	0 – 30 psig
	0 – 100 psig
	0 – 200 psig
	200 – 500 psig

	Flow capacity of Test pneumatics
	Low Volume – low flow manifold
	Standard flow – volume manifold
	High flow manifold (5 x higher flow)
	High pressure manifold (over 200 psi)

	Pneumatic connections
	NPT
	Metric

	Instrument mounting
	Wall
	Bench or shelf

	Power source for instrument
	120 VAC
	230 VAC
	24 VDC

	Digital I/O Voltage
	120 VAC
	24 VDC

	Wiring connections to I/O and Ethernet
	Hardwiring by customer
	CTS supplied pre-wired industrial cabling for I/O and Ethernet

	Exhaust Options
	Normal Exhaust
	External Exhaust AC
	External Exhaust DC

	Pneumatic Seal Options
	No seal option
	Pneumatic seal option AC
	Pneumatic seal option DC

	External Fill Valve
	No External Fill valve
	Fast Fill External Valve

1st Test Leak Rate _____
 1st Test Pressure _____
 2nd Test Leak Rate _____
 2nd Test Pressure _____