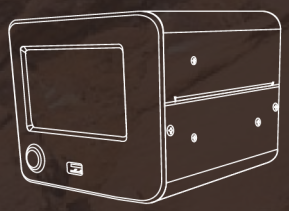

Isaac PD

Pressure Decay Leak Tester

A User's Guide

Ver. 1.00

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801.264.1000

HEADQUARTERS:
2442 South 2570 West
West Valley City, UT 84119

***Wall or stand mounted**

*Fixture Not Included - (Example of use)

For Your Safety.

Install all equipment according to local safety codes.

Additional guidelines when working with the Isaac PD Pressure Decay Leak Tester:

- Always wear eye protection when working with compressed gas.
- Beware of possible hazardous voltages present inside the enclosure.
- Do not attempt any maintenance procedure discussed in this guide until proper understanding of the tasks involved has been attained.

WARNING! Always disconnect power before removing cover or fuse holder.

CAUTION! Equipment requires a clean-dry air supply. Failure to comply may void warranty.

Introduction

The Isaac PD Leak Tester is the latest product from Zaxis designed to meet today's quality assurances demands.

The compact size of the Isaac PD makes it easy to use in a variety of testing situations. By reducing the internal and connection volumes, the test sensitivity will increase and test times can be reduced. This small internal volume, combined with integrated sensors and a 24bit analog to digital convertor, allows Zaxis to offer a leak tester with the highest sensitivity on the market.

This guide covers the standard Isaac PD Leak Testers. All the current functions and features are found in this guide. Your tester could differ in installed features.

Safety and Emissions

CE

Operating Environment Conditions:

Indoor Use Only

Operating Temperature Range:	5-40° C
Maximum relative humidity:	80%
Main supply voltage:	120 V ~ 60 Hz ± 10%, 2A
	Or 230 V ~ 60 Hz +/- 10%, 1A
Altitude:	up to 2000 meters
Supply Air Pressure:	8.3 bar max. (unless otherwise specified)

- ◇ Supply air must be clean and dry.
- ◇ (10-micron filtration minimum, 5-micron recommended)

3 Control Screens.

Fig. 3. About Screen for the Isaac PD.

▶ **Run Mode —** Press this button to change to the run mode to begin testing.

Prog **Program —** Contains three sub-menus (Pressure, Fixture, and Settings) that control the parameters of the test.

Units **Units —** Engineering units and the displayed sensor resolution.

Calibrate **Calibrate —** Calibration settings.

Options **Options —** Contains eight user options (Touchscreen Calibration, Clock, I/O Setup, Data Logging, Change PIN, Serial Port, Ethernet Settings).

About **About —** Lists the firmware revision level, serial number, and contact info for Zaxis. (see Fig 3.)

3.1 Data Input.

Two data input screens are used throughout the tester's setup and operation:

1. Numeric keypad screen — used to input values for the timer and limit fields.
2. Alpha-Numeric keypad screen — used in text fields
   - » Example: The Program Name Field.

Examples of each are shown below:

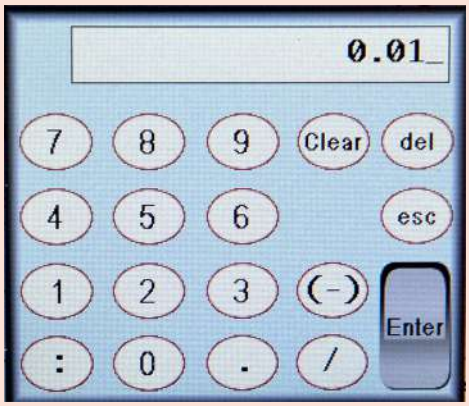

Fig. 4a. Numeric Keypad Screen.

Fig. 4b. Alpha-Numeric Keypad Screen.

To access: press desired data field with your finger or stylus.

Press the **SHIFT** key to change case.

4 Configuration.

The configuration of this unit is separated into four main menus with user configurable settings:

Prog	Program Settings
Units	Engineering Units and Resolution
Calibrate	Sensor Calibration Settings
Options	User options (Touchscreen Calibration, Clock, I/O Setup, Data Logging, Change PIN, Serial Port, and Ethernet Settings)

CAUTION! Unauthorized changes in the calibration menus will affect the functionality of the test.

Program Settings

Three menus control all the parameters associated with the test process:

Pressure	Pressure test settings
Fixture	Fixture valve settings
Settings	Test parameters

4.1 Pressure.

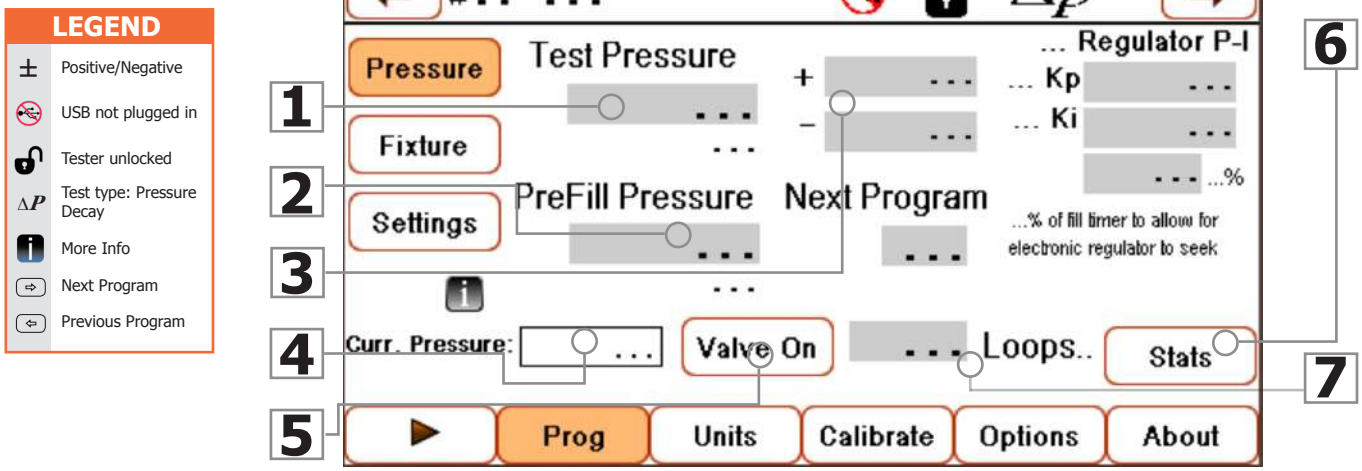

Fig. 6. Pressure Settings Screen.

Entering the same number as the current test will not loop tests.

A test failure will cancel the jump to the next program

1. **Test Pressure** — Press the Test Pressure data field and enter desired test pressure on the numeric keypad screen.
2. **Next Program** — Link programs together by entering the number of the next program (upper left corner) in the Next Program data field. This allows the tester to jump to the desired next program upon a pass result in the current test.
3. **Pressure Tolerance ±** — The amount of tolerance on the test pressure. Enter positive (+) and negative (-) limits in the data field to the right of the Test Pressure data field.
4. **Current Pressure** — Displays the current pressure when Valve On is check and test port is capped.
5. **Valve On** — Check box the opens the test port valve.
6. **Stats** —
7. **Loops** — Loops programs however many times

Setting Test Pressure

To set the test pressure, place a master part or plug onto the test port.

1. Press the Test Pressure data field with your finger or stylus and enter the test pressure value on the numeric keypad screen.
2. Set the desired ± Pressure Tolerances.
3. Check the Valve On box.
4. The internal pneumatics will open to allow the pressure from the regulator out to the front port.
5. The pressure sensor will show the current pressure in the Curr. Pressure data field.
6. Adjust the regulator until the specified pressure from the Test Pressure value field is achieved.
7. Uncheck the Valve On box when finished.

Parameters to USB

The parameters of test can be either saved to or loaded from an external USB plugged into the USB port on the front of the tester.

4.2 Fixture.

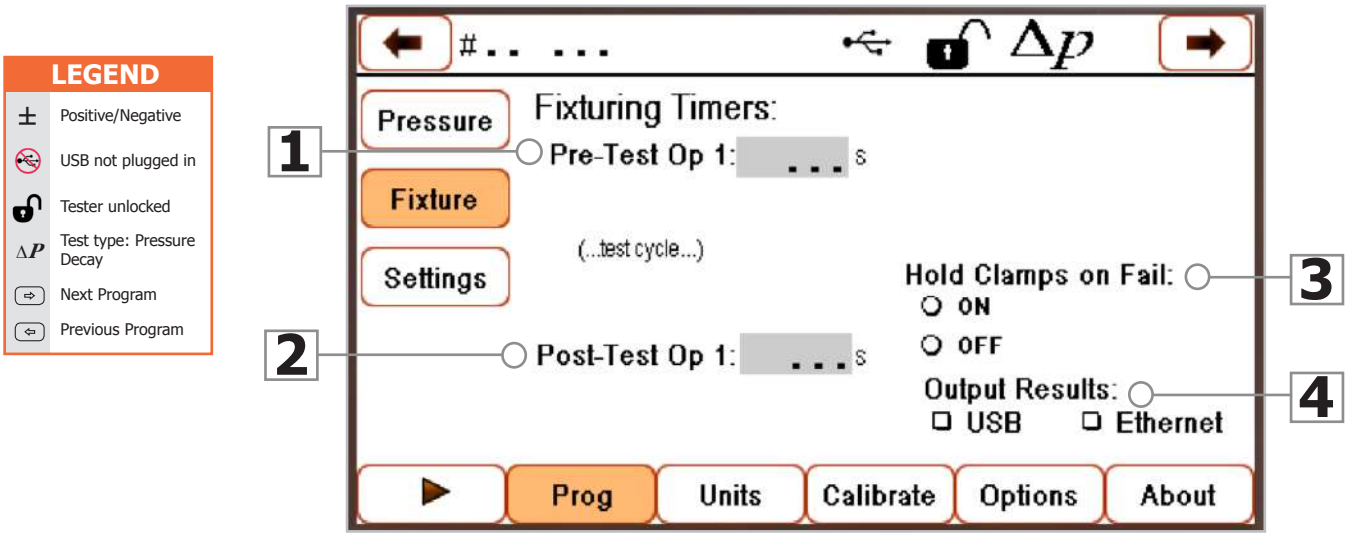

Fig. 7. Fixture Settings Screen.

Clamps, Coupling outputs, and Fixturing Timers are all similar terms used to describe pneumatic outputs that can be used for various functions.

These outputs are used to actuate tooling, manipulate a part, or activate a pneumatic seal around a part.

The fixture menu controls the fixturing valves. These valves can be used to activate pneumatic fixturing tools or seals to capture the part for testing.

All outputs are supplied as four-way valves with one normally open and one normally closed port. The outputs can be used as a three-way valve by plugging the normally open port. The normally open port will be plugged from the factory.

1. **Pre-Test Op 1** — The amount of time the output will be set prior to test start.
2. **Post-Test Op 1** — The amount of time until the valves de-energize at the end of the test.
3. **Hold Clamps on Fail —** Keeps the clamps in their test position and the fail indicator LED will flash to alert the user of failure.
4. **Output Results** — Output the results via USB or Ethernet.

Setting Fixture Timers

To set the test pressure, place a master part or plug onto the test port.

1. Press the Pre-Test Op 1 data field with your finger or stylus and enter your values with the numeric keypad screen.
   b. A minimum value of 0.1 sec. must be entered in the data field. This time is the amount of time the output will be set prior to test start.
3. Press the Post-Test Op 1 data field with your finger or stylus and enter your values with the numeric keypad screen.
   a. Leaving the Post-Test Op 1 timer at zero will de-energize all valves at the end of the test.
2. Under Hold Clamps on Fail, select the on or off radio buttons.
   c. Select this option to keep the clamps in their test position and the fail indicator LED will flash to alert the user of failure.
   d. The user can acknowledge the failure by pressing the fail LED and the clamps will then follow the original set release timer.

! **The Pass/Fail results sent out to the I/O will not be posted until the failure has been acknowledged.**

Output Results

Select the check boxes for USB or Ethernet, in conjunction with set Data Logging options (discussed in Data Logging section) to output the desired results to either a USB drive or over Ethernet.

6 Reference.

6.1 Test Tooling and Fixtures.

To achieve accurate and repeatable results, tested units must be presented to the tester in the same fashion every time. The tooling must also be robust enough to withstand daily repeated use.

The following are some key points to keep in mind in your tooling and fixture designs:

- **Operator Safety**
  - » Zero-access, No pinch points
  - » Ergonomically designed
  - » Simple load/unload
- **Material Selection**
  - » Stainless Steel
  - » Anodized Aluminum
  - » Delrin, etc.
- **Sealing Forces —** Exerted forces should not mask possible leaks.
- **Single or Multi-purpose —** Should the tool be dedicated to a single task or fit multiple models?
- **Size —** How much production space do you have?
- **Component Selection —** Custom designed pieces or off-the-shelf technology?

Zaxis can deliver a complete turn-key system designed to your specifications.

6.2 Engineering Data.

Converting Pressure to Flow Rate

You can determine the leak rate in flow units (cubic centimeters per minute) based on the pressures measured by the Isaac. In a pressure decay test, the Isaac holds the pressure drop on the main screen. The pressure drop is the delta pressure (ΔP) in the formula.

Delta time (Δt) is the test timer value set in the Isaac's pressure decay program (provided the test passes). With this timer being set in seconds, simply divide by 60 to get the delta time in minutes.

Volume is the part volume plus the Isaac's internal test circuit (approx. 1cc) plus the volume of connections between the Isaac's test port and the product. The total volume (for our example) must be in cubic centimeters.

Atmosphere is the absolute barometric pressure in mbar (approx. 1000 mbar at sea level). This number changes with weather conditions.

$$\textbf{Leak Rate}\ (\text{cc/m}) = \frac{\Delta\textbf{P}\ (\text{psi}) \bullet \textbf{Volume}\ (\text{cc})}{\Delta\textbf{t}\ (\text{minutes}) \bullet \textbf{Atm}\ (\text{psi})}$$

Δ**P** = Decay in pressure, value shown at end of test.
Δ**t** = Test step time in minutes (test time reads in seconds divide by 60).
Volume = Volume of product and leak tester and any fixture volume.
Atm = Atmosphere pressure (psia) eg sea level = 14.7 at 68˚F. Adjust at elevation is required.

6.3 Physical Laws.

Presented here is an abbreviated history and overview of the fundamental laws of physics dealing with pressure and flow measurement.

Pressure — In physics, pressure is a force measured in terms of its distribution over a given area. This is expressed as force (F) divided by a unit area (A) of the surface area to which the force is applied. Air pressure most commonly refers to a force exerted uniformly in all directions. Force x Area = Pressure.

Absolute Pressure — Pressure measured with respect to zero pressure (a very high vacuum).

Gauge Pressure — Pressure measured with respect to surrounding air pressure (the pressure exerted by the weight of the atmosphere).

Barometric Pressure — the surrounding pressure caused by the atmosphere. At average sea level, barometric pressure is approximately 14.7 pounds per square inch, or 29.9 inches of mercury. This is equivalent to 101.3 Kilopascals.

Negative Pressure (Vacuum) — Vacuum is defined as a volume void of matter. For practical purposes, this means a volume where as much matter as possible has been removed. A perfect vacuum does not exist even in the depths of space, where any given volume will probably contain one or more particles of matter or one or more units of energy, which is the equivalent of matter (Relativity). Even a vacuum with no measurable energy level is only a "virtual" vacuum.

Air Composition — Our atmosphere is composed almost entirely of oxygen and nitrogen in their diatomic forms (two atoms bound together by chemical forces). Diatomic nitrogen makes up approximately 78% of the total molecules in the atmosphere. Diatomic oxygen represents nearly 21%. The inert noble gas, argon, accounts for about 0.9%, and the remaining 0.1% is composed of many trace gases, the most significant being carbon dioxide and water vapor. Water vapor is present in highly variable quantities ranging from 0 to 4% by volume.

6.4 Glossary.

A List of useful terms and where to find additional information.

A

Abort a test, how to — Press the start button during the test. ABORT pops up in the status box telling you the process has stopped. An aborted test does not register on the tested or reject counters.

Atmosphere (1) — in this guide, atmosphere means room air pressure. Atmospheric pressure is nearly synonymous with barometric pressure—an external force pushing on all sides of every object on earth's surface. During a flow test, product being tested must flow into atmosphere, which causes a resistance to flow called back-pressure. Room atmosphere can change due to fluctuations in air conditioning or changing weather conditions. **(2)** The word atmosphere can refer to a unit of measure equal to pressure at average sea level. By convention, one atmosphere equals 1 bar. To say a test was taken at one atmosphere means the test was made at (or converted to) average sea level.

B

Barometric Pressure — Also called atmospheric pressure. The force caused by the mass of air pressing down on the earth. Barometric pressure changes with elevation and weather conditions. The Isaac's regulator compensates for changes in barometric pressure to provide a constant relative output.

Bulkhead Fitting — A connection passing through a panel or enclosure. One bulkhead on the back of the Isaac is used for connecting the air supply to the tester. Bulkheads on the front are used for test and coupling ports. Standard bulkheads on the front have a 1/8" NPT (similar to R1/8 BSPT British Standard Pipe Taper) female thread. Isaac offers a variety of bulkhead options.

7.1 Internal Leaks.

At the factory a baseline leak test is performed to verify leak-tightness and functionality. This test is a good indicator of an internal leak. The parameters are listed below:

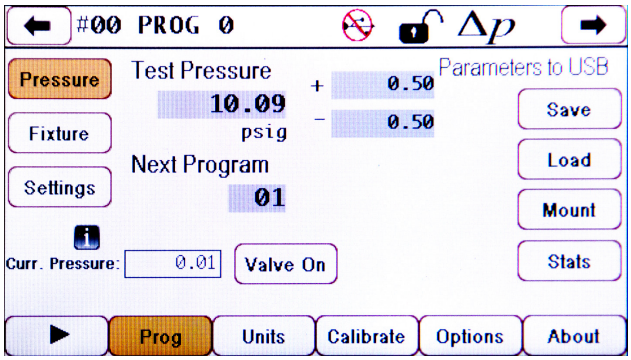

Fig. 19a. Pressure settings screen.

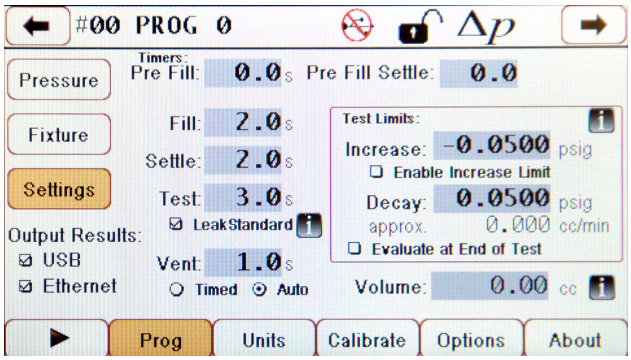

Fig. 19b. Settings screen.

Running a capped port test with these parameters should yield a decay value less than 0.005 psig (0.344 mbar).

Valve Manifold

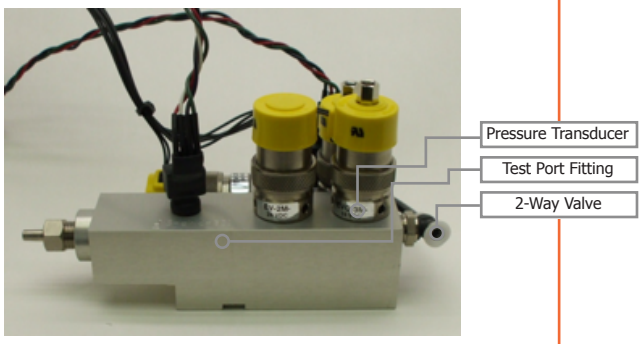

Fig. 20. Valve manifold.

The most common place for leaks to occur is at the junction of the test port fitting to the valve manifold.

Pnuematic Diagram

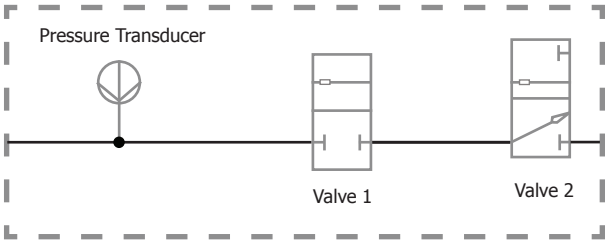

Fig. 21. Pnuematic Diagram

When the test pressure is vented, the airflow path is through Valve 1 (on) and out to atmosphere through Valve 2 (off).

Debris from test parts or dirty air can be trapped between the spider seal and valve seat of the 2-way valve, holding the valve in an open position.

8 Mounting.

1

Fixture purchased separately. Contact us for pricing.

2

Isaac PD - Compact size, easy transport from desktop to wall mount or fixture

3

Isaac PD metal backplate comes with four pre drilled holes for mounting screws

4

Place Isaac PD on top two screws then screw bottom two screws. Once secure, tighten all screws.

5

Connect all connectors and test ports including power and air supply

6

Begin set up and start testing. Isaac PD includes USB drive for exporting data quickly.

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