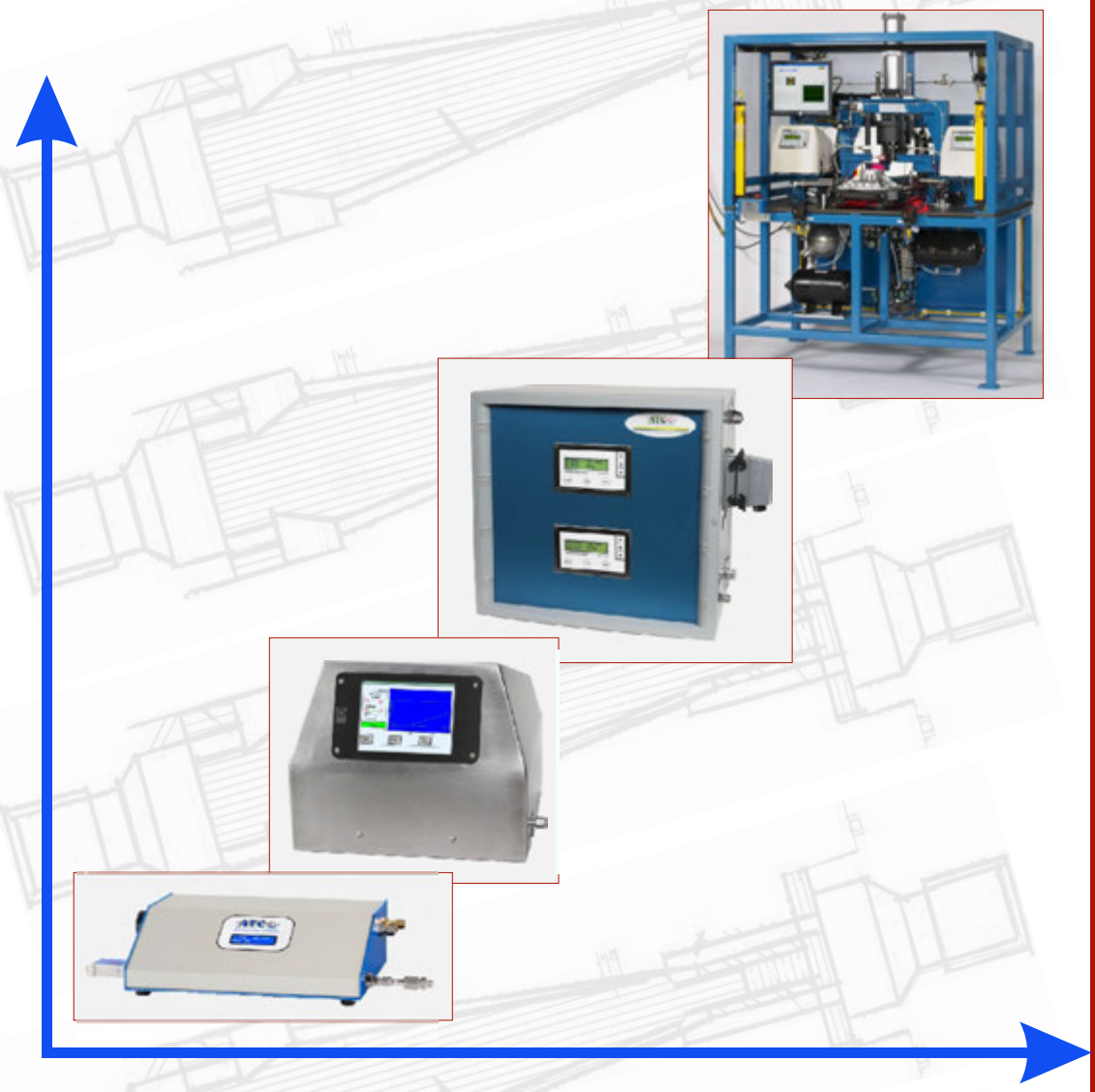
LEAK TESTING
The Optimum Solution to An Engineering Challenge



Leak Testing Instrumentation ♦ Micro-Flow Sensors ♦ Gas Flow Standards
Equivalent Channels ♦ Calibrated Leaks ♦ Leak Test Systems

ATC Inc.
ADVANCED TEST CONCEPTS

ilac-MRA A2LA ACCREDITED
CERT# 2197-01,2197-02
TYPE: CAL., TEST

LEAK TESTING
The Safe Solution to An Engineering Challenge

Introduction

Advanced Test Concepts (ATC), Inc. has the innovative *micro-flow technology* for leak testing. Our patented micro-flow sensors have introduced a new dimension in leak testing. They offer a breakthrough in leak testing with *short cycle times*, *temperature stability*, and *low measurement ranges* that could only be achieved with helium mass spec. in the past. ATC's micro-flow sensors perform direct and accurate measurements with *no need for "daily" calibration,* which makes for an affordable leak test instrument with simple set up.

ATC products are designed for testing your applications under pressure or vacuum, which utilizes our mass extraction technique. ATC manufactures a variety of complete leak test instruments with optional accessories like calibrated leak orifices and equivalent channel standards as well as calibration standards.

ATC can help you specify your leak tightness requirements and calibrate your products and standards with our unique standards calibration laboratories and testing facilities. ATC is an ISO 17025 accredited company with an A2LA accredited laboratory, certificate numbers 2197-01 and 2197-02. ATC's various branches located worldwide provides extensive application support.

The following information will provide you with further specifications on our products. However, it's difficult to summarize ATC's more than 20 years of industry experience in one catalog. Please contact our application engineers for more specific details in order to analyze your application needs.

Contact Us:
Ph: (317) 328-8492
Fx: (317) 328-2686
Email:
atc@atcinc.net
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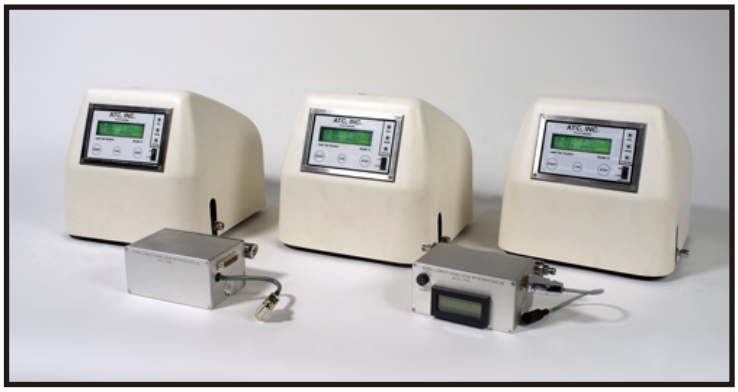
Our Products



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The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Version 1.23

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Applications

AUTOMOTIVE

- Casting Porosity
- Engine
- Transmissions
- Torque Converters
- Clutches
- Fuel System
- Braking Components
- Braking Systems
- Brake Lines
- Heat Exchangers
- AC Systems
- Batteries - Automotive
- Fuel Bundles
- Chassis Components
- Electronic systems

MEDICAL & PHARMACEUTICAL

- Vials - packaging
- Bottle - packaging
- Pouches - packaging
- Blister Packs - packaging
- Sterility Integrity
- Catheters
- IV Bags
- Balloons
- Tubes
- Syringes
- Valves
- Implanted Medical Devices

HVAC

- Castings
- Compressors
- Heat Exchangers
- Tubes
- Dryers
- Valves

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INDUSTRIAL

- Pneumatic Components
- Hydraulic Components
- Actuators
- Valves
- Regulators
- Cylinders

OTHERS

- Electronic Enclosures
- Sensors
- Water-proof devices
- Fuel Delivery/Dispensers
- Natural Gas Meters
- Natural Gas Appliances and Cook Tops
- Pressure Vessels
- Natural Gas Components
- Nuclear Tubes, Vessels, & Components
- Beverage Packaging
- Food Packaging
- Aerospace Oxygen System
- Aerospace Engine and Components
- Batteries - Commercial

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Applications

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MICRO-FLOW Sensors - The Intelligent Gas Leak Sensor (IGLS)

Introduction

The Intelligent Gas Leak Sensor (IGLS) is a range of revolutionary Micro-Flow Sensors using AIR for leak testing. The leak flow measurement is based on the mass conservation law, where the IGLS measures, unlike other traditional methods, the flow rate of make up air added to the unit under test. The incoming flow rate at steady state condition is equal to the amount of mass leaking out.

The IGLS is an integrated micro-sensor based on ATC's patented accelerated laminar flow (ALF) design, measuring flow, pressure and temperature. The IGLS is the only existing sensor where its output is proportional to the volume flow in the viscous and slip flow regimes (in pressures from vacuum to high pressure) and proportional to the mass flow in the transitional and molecular flow regimes.* The IGLS includes a built-in micro-processor based leak test controller, which enables direct leak flow measurement.

ATC's Micro-Flow Technology, the IGLS, introduces a new dimension in leak testing. It offers a breakthrough in leak testing with *short cycle time*, *temperature stability*, and *low measurement ranges* that could only be achieved with helium mass spec. in the past. The IGLS performs direct and accurate measurements with *no need for "daily" calibration,* which makes for an affordable leak test instrument with simple set up.

ATC's Mass Extraction Technology takes advantage of the Micro-Flow phenomena and gas expansion which occurs while the test is conducted in vacuum. ATC's Mass Extraction IGLS sensors demonstrate sensitivity similar to most of helium mass spectrometry (HMS) applications, typically starting from $5x10^{-7}$ sccs.

ATC's patented Adaptive Test feature enables the IGLS to learn parts signature and dynamically accepts or rejects the unit under test based on statistical consideration. This feature further reduces average cycle time, making ATC's Micro-Flow Technology the fastest leak test method on the market.

The IGLS is a part of ATC's complete leak test instruments, which can operate as a stand alone bench top or portable unit or part of a larger, automated test system.

**Viscous, slip, transitional and molecular flow are micro-fluid dynamic terms.*

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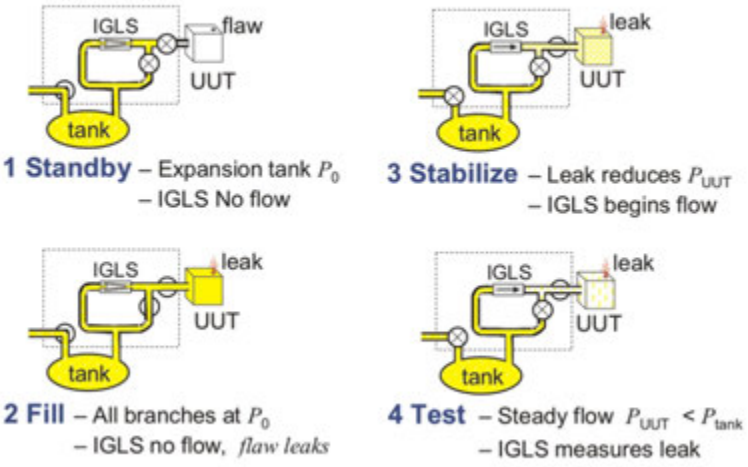
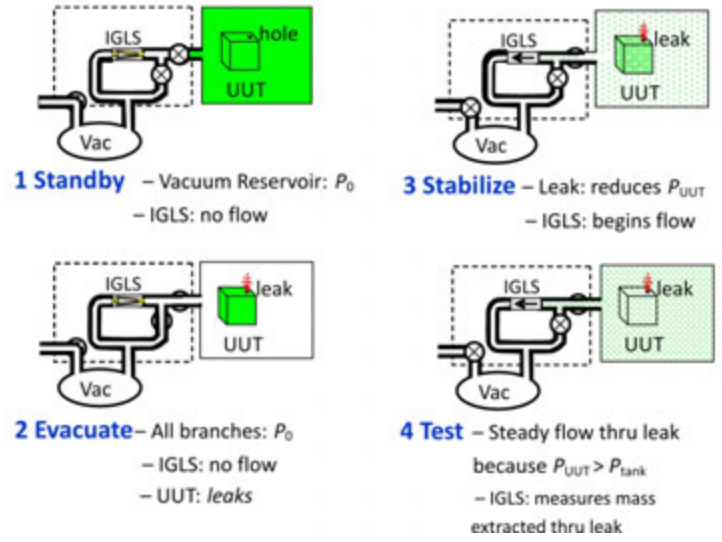
"How It Works"

Method of Operation – Pressure Test



Method of Operation – Vacuum with Mass Extraction



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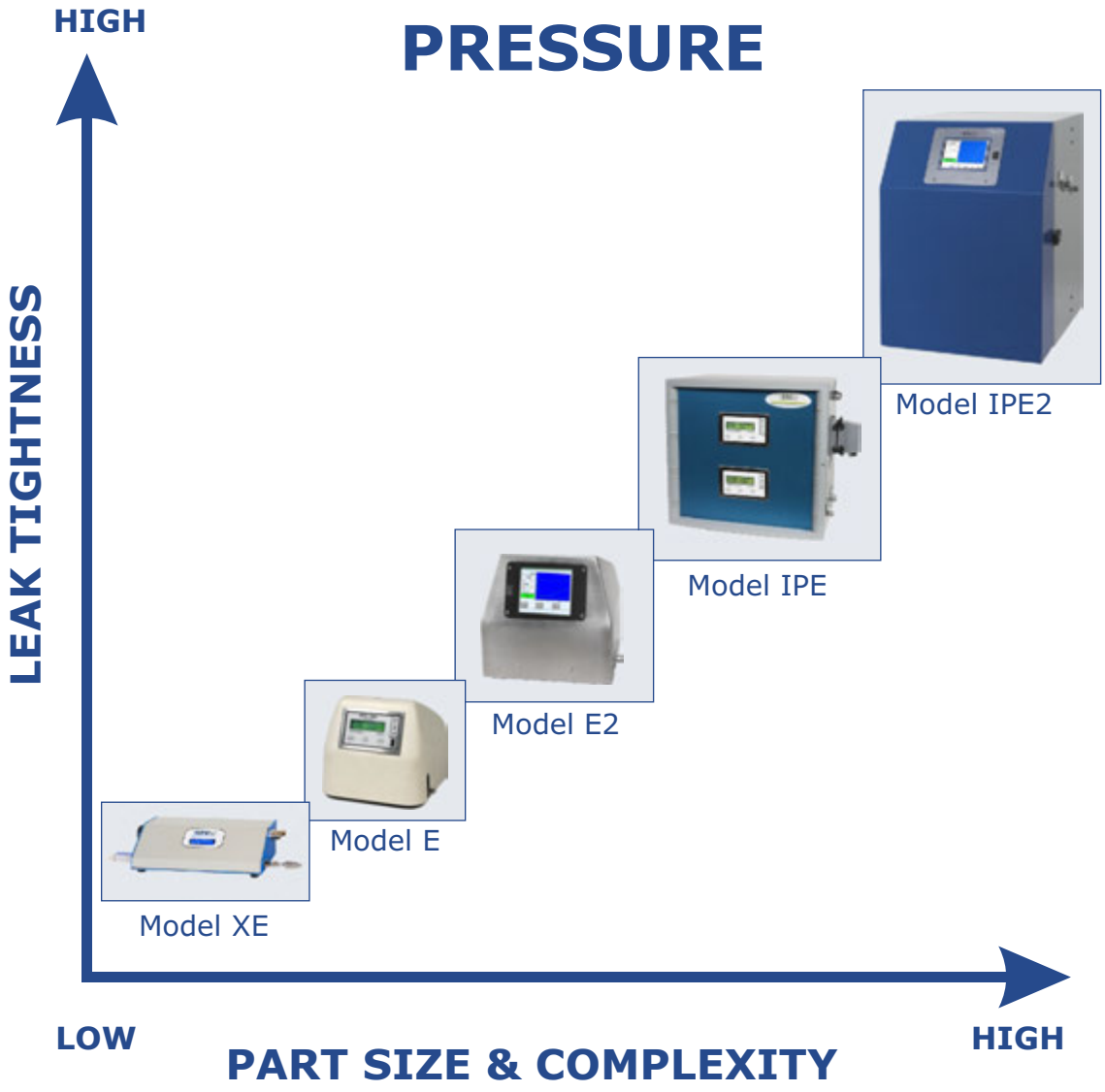
Leak Testing - An Engineering Challenge



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The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Leak Test Instruments

MODEL XE

Instrument Applications

- Leak Testing under pressure (max. 50 psig)
- Leak Rates of 1cc/min or 0.5cc/min (optional) and higher
- Small to medium size parts (1,000cc or less typical)

Features

- Simple to use
- Automated Pressure Test Circuit
- Two Line, Alpha Numeric Display
- Digital I/O
- Serial interface
- Leak-Tek Program™
- Expansion tank, externally mounted
- Calibrated Orifice (optional)
- Reliable Instrument
- Tamper-Proof
- Temperature stable - Does not require zero'ing or daily calibration
- Direct Flow measurement is not volume dependent
- Measurement is Direct, Not Calculated - Reducing Errors

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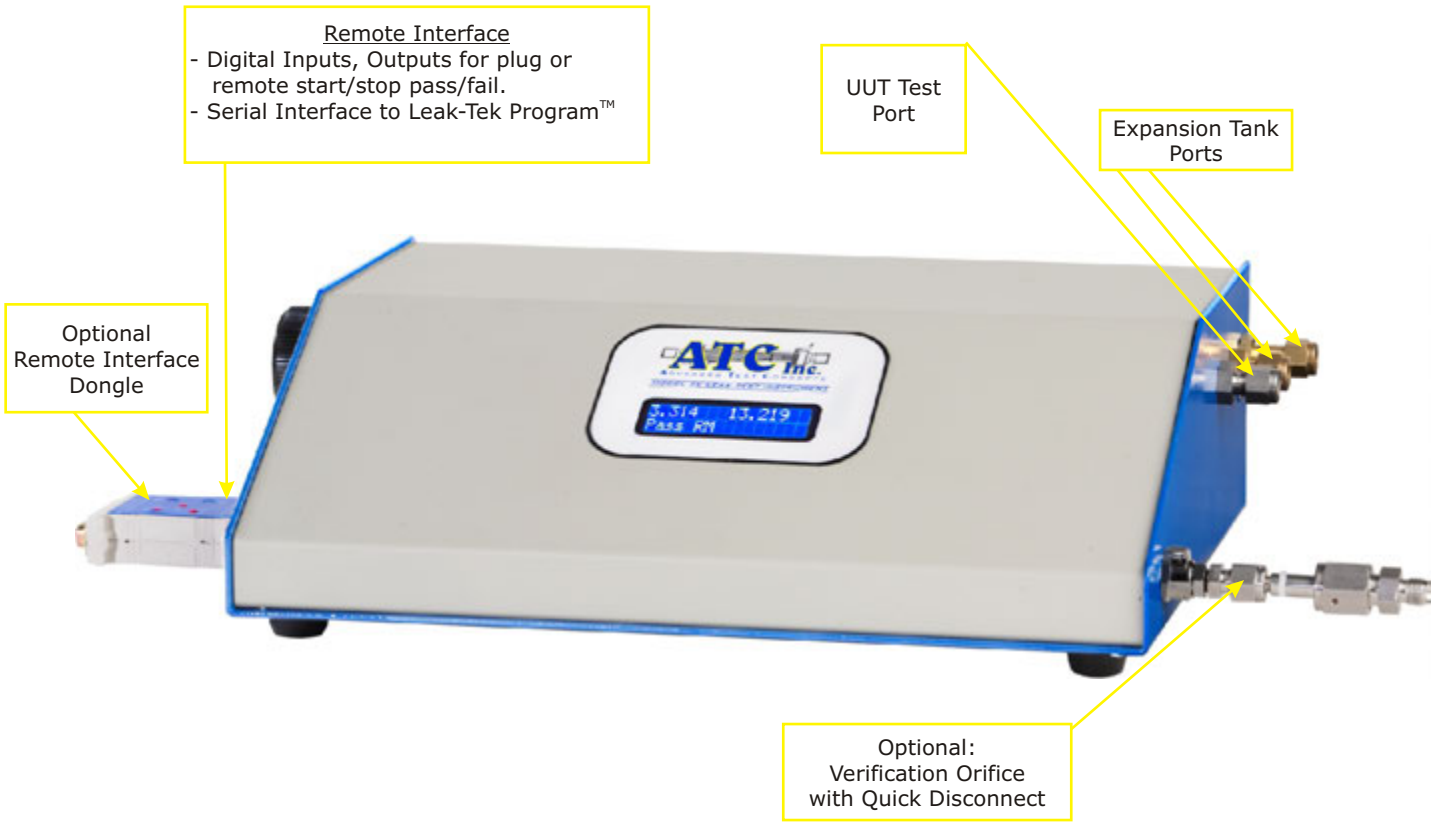
Leak Test Instruments

MODEL XE

SPECIFICATIONS

- Flow Measurement Ranges: 8, 15, 40, 80, and 200cc/min.
  -Measurement Uncertainty: +/- 3% of reading, Calibration Range
- Pressure Measurement: 0-50 psig
  -Measurement uncertainty: +/- 1% of full scale
- Gases: Dry Clean Air/Nitrogen
- Dimensions: 15”W, 4.75”H, 10.5”D
  (Does not include connectors, fitting, and accessories)
- In-Line Filter (Internal) - Included



The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Leak Test Instruments

MODEL E

Instrument Applications

- Leak Testing under pressure (max. 160 psig)
- Leak Rates of 0.1 cc/min and higher
- Small to medium size parts

Features

- Micro-Flow sensor-Intelligent Gas Leak Sensor (IGLS)
- Automated PRESSURE test circuit
- Front character display and test buttons
- Built in Verification Orifice
- Digital and analog I/O Interface
- Serial interface

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Leak Test Instruments

MODEL E

APPLICABLE MICRO-FLOW SENSORS (IGLS)

Model: IL2-C

IL2-M at pressure to 10 psig

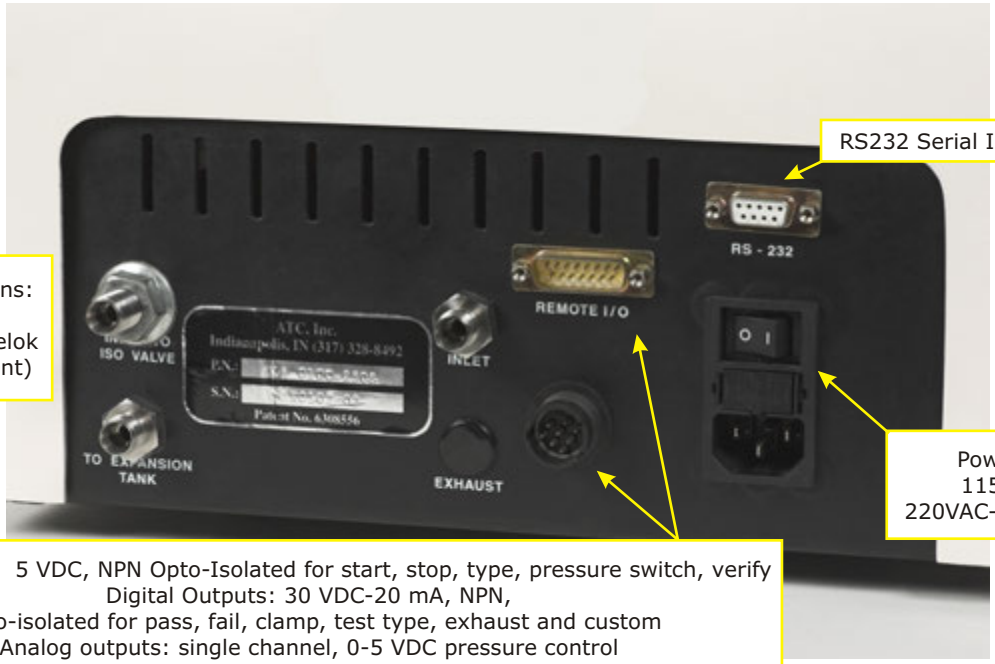
SPECIFICATIONS

Dimensions

- 12''W, 11.5''H, 12''D (Does not include connectors & fittings)
- Expansion tank and pressure regulators are externally mounted

Gases

- Dry, clean gases: air, nitrogen
- For other gases consult ATC



AVAILABLE OPTIONS

See options chart for all available options.

The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Leak Test Instruments

MODEL VE

Instrument Applications

- Leak Testing under vacuum (2 psia to barometric pressure)
- Mass Extraction Tests
- Leak rates of $5x10^{-4}$ sccs
- Small to medium size parts

Features

- Micro-Flow sensor-Intelligent Gas Leak Sensor (IGLS)
- Automated VACUUM test circuit
- Front character display and test buttons
- Built in Verification Orifice
- Digital and analog I/O Interface
- Serial interface

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Leak Test Instruments

MODEL VE

APPLICABLE MICRO-FLOW SENSORS (IGLS)

Models: IL2-M and IL2-C

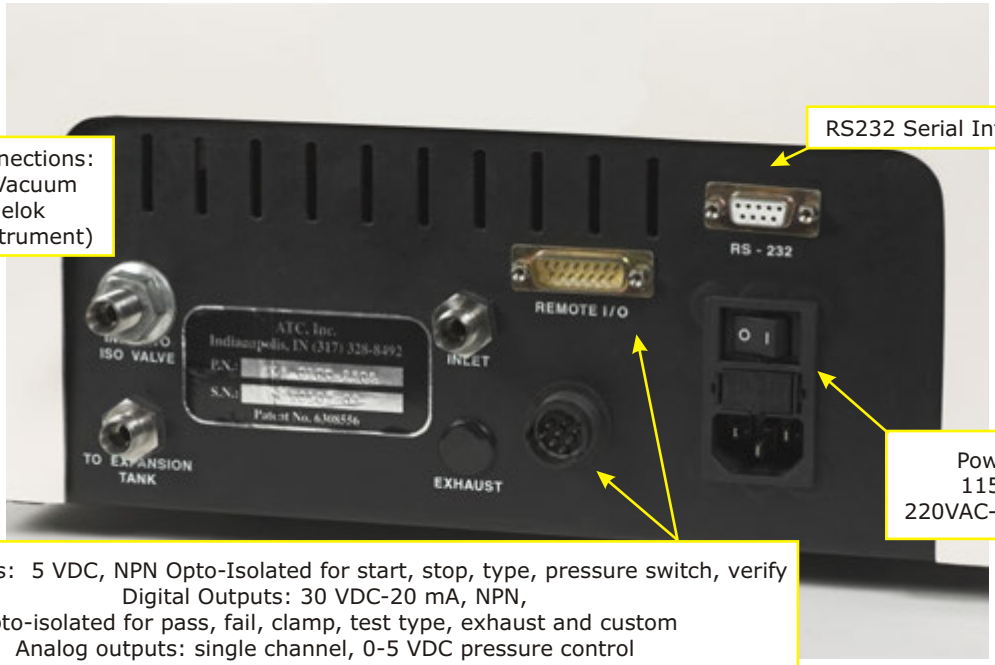
SPECIFICATIONS

Dimensions

- 12''W, 11.5''H, 12''D (Does not include connectors & fittings)
- Expansion tank and pressure regulators are externally mounted

Gases

- Dry, clean gases: air, nitrogen
- In-line filter is included at test port



Pneumatic connections:
Test Ports & Vacuum
3/8” Swagelok
(On side of instrument)

RS232 Serial Interface

Power Supply:
115VAC-60Hz
220VAC-50Hz (optional)

Digital Inputs: 5 VDC, NPN Opto-Isolated for start, stop, type, pressure switch, verify
Digital Outputs: 30 VDC-20 mA, NPN,
Opto-isolated for pass, fail, clamp, test type, exhaust and custom
Analog outputs: single channel, 0-5 VDC pressure control

AVAILABLE OPTIONS

See options chart for all available options.

The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Leak Test Instruments

MODEL E2

Instrument Applications

- Leak Testing under pressure (max. 160 psig)
- Leak Rates of 0.1 cc/min and higher
- Medium sized parts, higher throughput
- Clean room or industrial applications
- User friendly Operator interface - stand alone applications

Features

- Micro-Flow sensor-Intelligent Gas Leak Sensor (IGLS)
- Automated PRESSURE test circuit with Balance and Quick-Fill features
- Front TFT graphical color display with TOUCH screen
- Built in Verification Orifice
- Digital and analog I/O Interface
- Ethernet or serial interface
- Stainless steel enclosure for cleanroom
- Multiple test profiles

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Leak Test Instruments

MODEL E2

APPLICABLE MICRO-FLOW SENSORS (IGLS)

Models: IL2-C
IL2-M at pressure to 10 psig

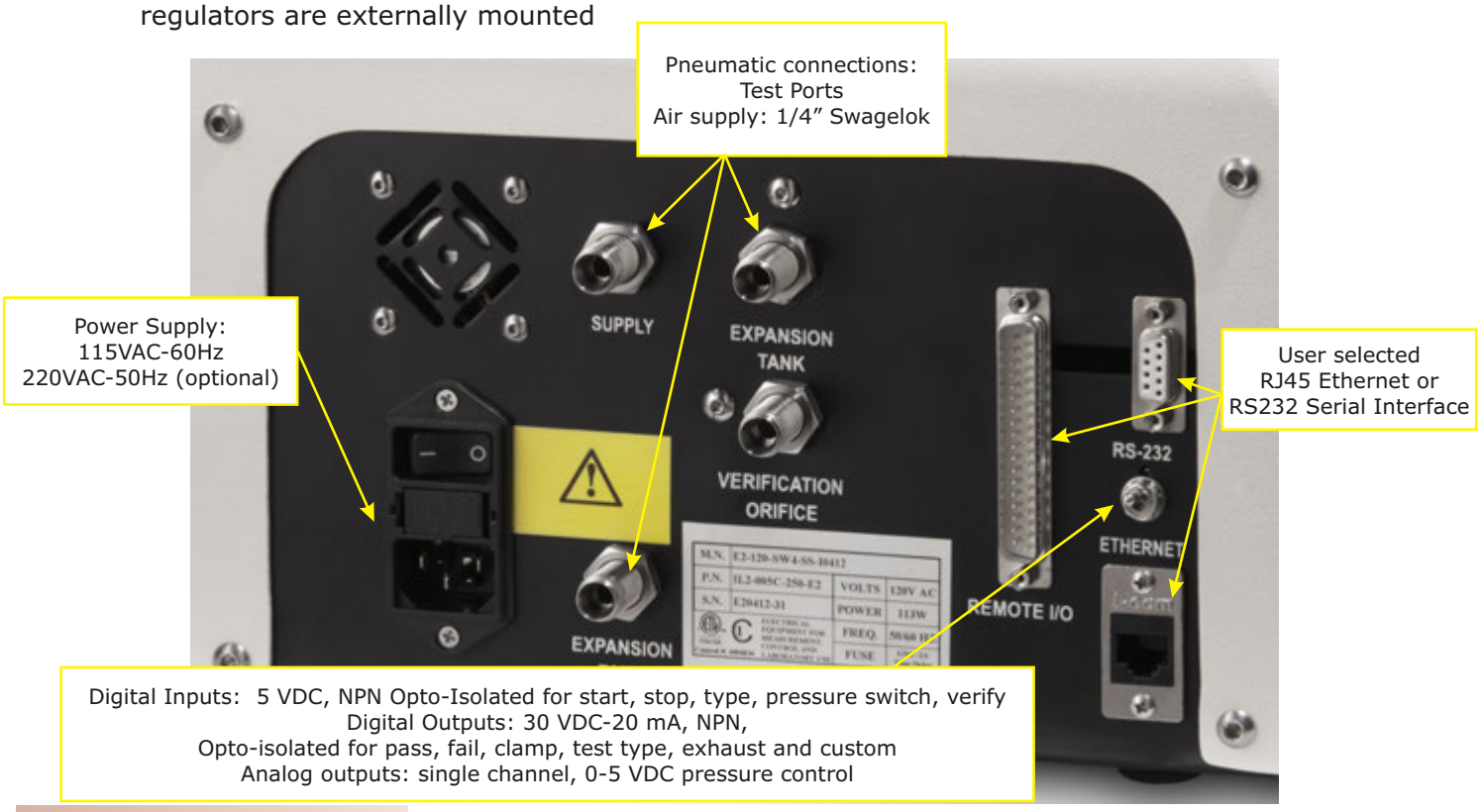
SPECIFICATIONS

Dimensions

- 12''W, 12''H, 12''D (Does not include connectors & fittings)
- Expansion tank and pressure regulators are externally mounted

Gases

- Dry, clean gases: air, nitrogen
- For other gases consult ATC



AVAILABLE OPTIONS

See options chart for all available options.

The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Leak Test Instruments

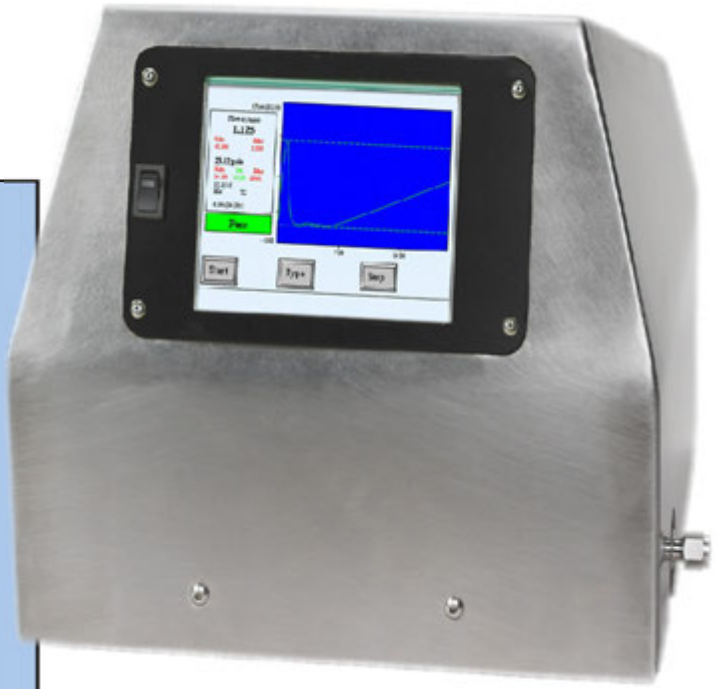
MODEL VE2

Instrument Applications

- Leak Testing under vacuum (2 psia to barometric pressure)
- Mass Extraction Tests
- Leak Rates of $5x10^{-4}$ sccs
- Medium sized parts, higher throughput
- Cleanroom or industrial applications
- User friendly Operator interface - stand alone applications

Features

- Micro-Flow sensor-Intelligent Gas Leak Sensor (IGLS-Vacuum Generation)
- Automated VACUUM test circuit with Balance and Quick-Fill valves
- Front TFT graphical color display with TOUCH screen
- Built in Verification Orifice
- Digital and analog I/O Interface
- Ethernet or serial interface
- Stainless steel enclosure for cleanroom
- Multiple test profiles



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Leak Test Instruments

MODEL VE2

APPLICABLE MICRO-FLOW SENSORS (IGLS)

Models: IL2-C
IL2-M at pressure to 10 psig

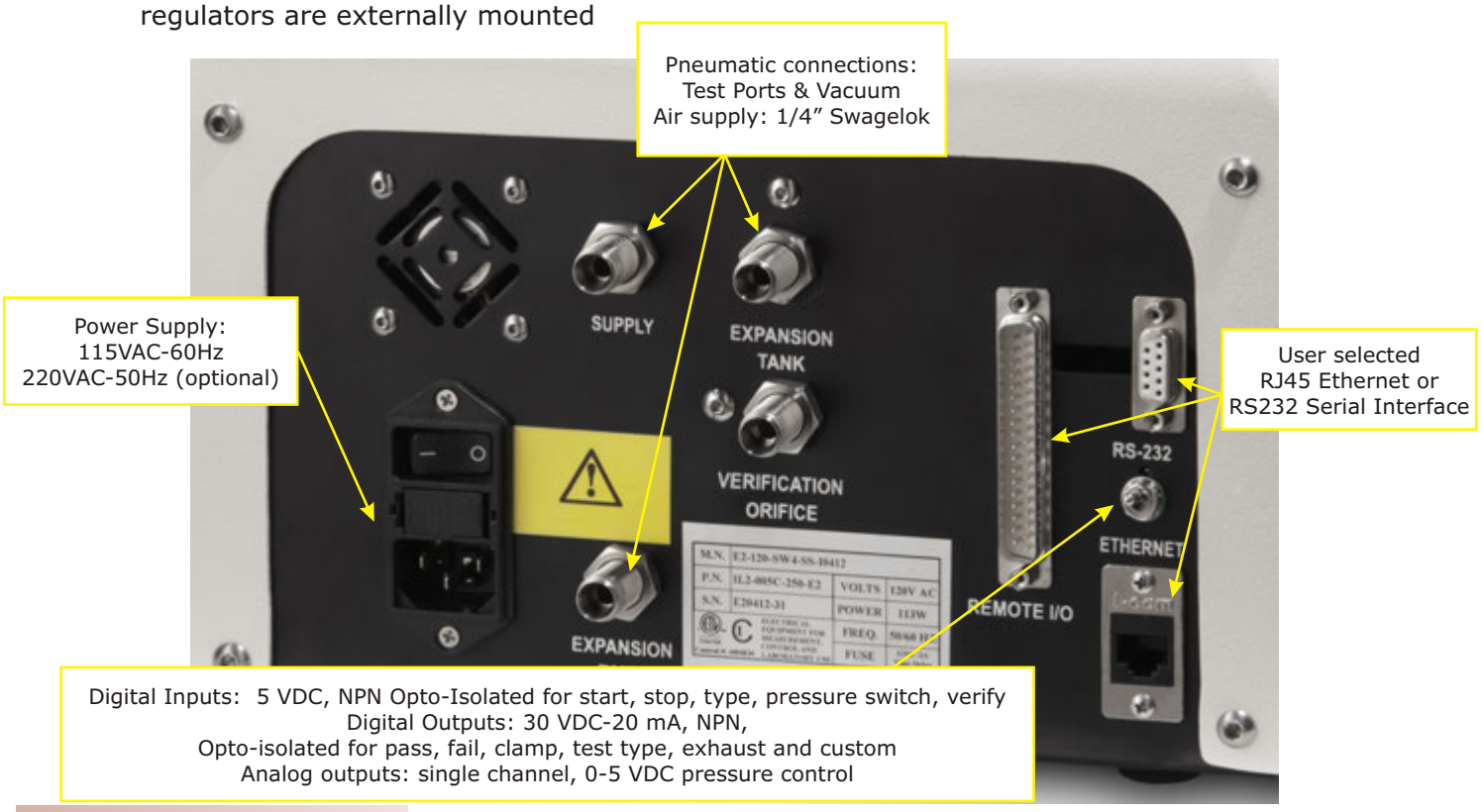
SPECIFICATIONS

Dimensions

- 12''W, 12''H, 12''D (Does not include connectors & fittings)
- Expansion tank and pressure regulators are externally mounted

Gases

- Dry, clean gases: air, nitrogen
- For other gases consult ATC



AVAILABLE OPTIONS

See options chart for all available options.

The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Leak Test Instruments

MODEL IPE

Instrument Applications

- One or two of the following tests:
  - Pressure Leak Test from 0.03 cc/min to 500 psig
  - Constriction or Blockage Flow Test, up to 5% part diameter constriction
  - Mass Extraction-vacuum tests from 0.02 cc/min at 2 psia
- One or Two Independent Test Channels
- Testing up to two set of parts simultaneously
- Sort function- testing multiple parts and sorting the rejects (Applicable as the IGLS measurement is not volume sensitive!)
- Large volume parts, complex parts and short cycle time
- Custom options

Features

- Micro flow sensor-Intelligent Gas Leak Sensor (IGLS)
- Single or Dual test channels with one or two of the following:
  - Leak Test Channel Pressure testing: Automated test with large volume Quick-Fill features.
  - Constriction/Blockage Flow channel with Intelligent Gas Flow Sensor (IGFS) and unique pressure control.
  - Vacuum test Channel - Mass Extraction tests to 2 psia vacuum.
- Optional Sort test controller: Leak Tests multiple parts simultaneously, and sorts out the rejected parts.
- For Each Test Channel:
  - Built in Verification Orifice and valve.
  - Character Display Interface.
  - Digital and analog I/O Interface
  - Serial Interface for each test channel.

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Leak Test Instruments

MODEL IPE

APPLICABLE MICRO-FLOW SENSORS (IGLS)

Models: IL2-C and IL2-L

Flow/Constriction/Blockage Tests: Model IF2-HF

Vacuum Leak Test: Model IL2-M

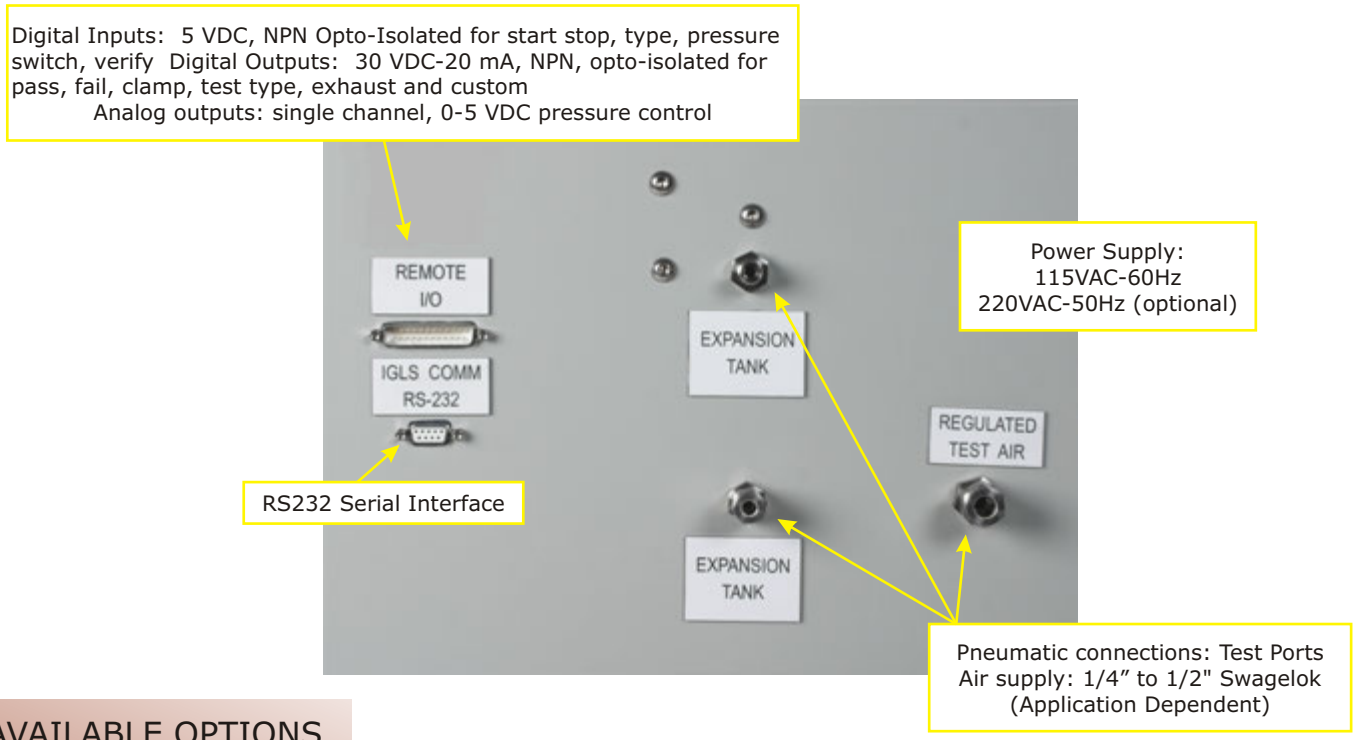
SPECIFICATIONS

Dimensions & Access

- 24''W, 23''H, 12''D (Does not include connectors & fittings)
- Dual access doors, NEMA 12 instrument enclosure
- Expansion tank and pressure regulators are externally mounted

Gases

- Dry, clean gases: air, nitrogen
- For other gases consult ATC



AVAILABLE OPTIONS

See options chart for all available options.

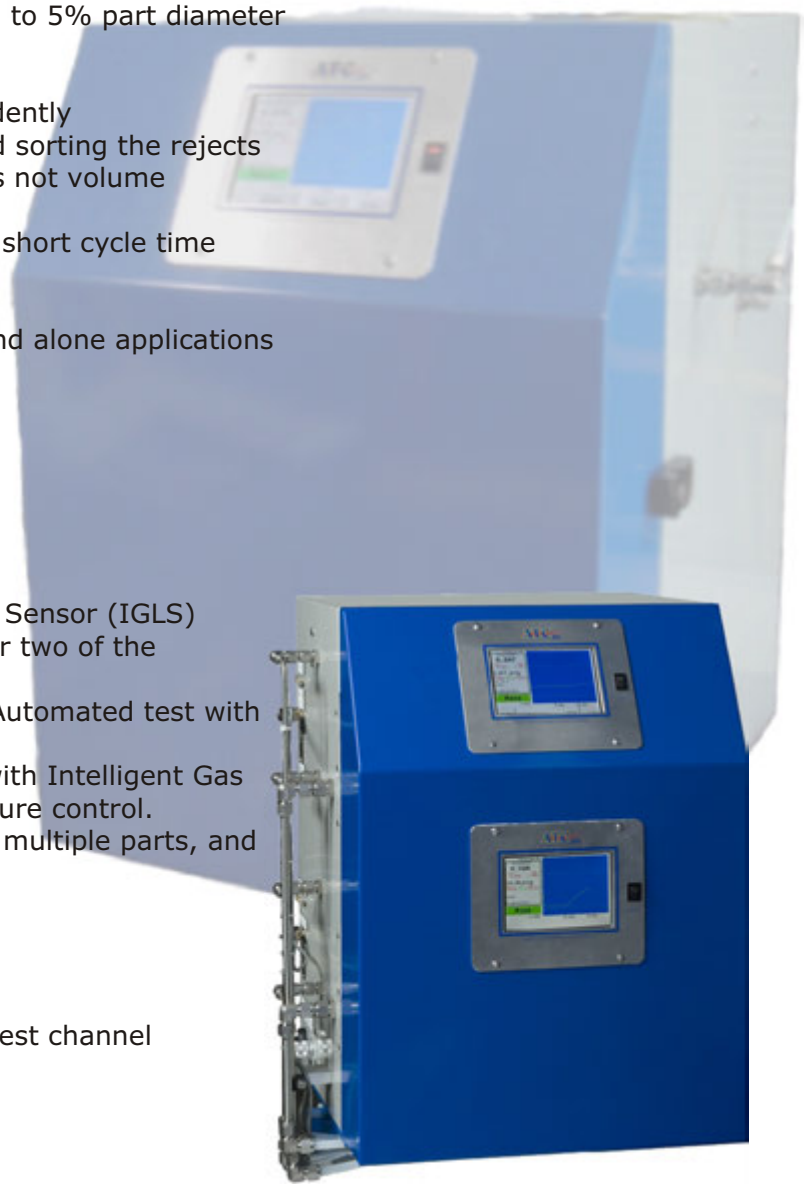
The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Leak Test Instruments

MODEL IPE2

Instrument Applications

- One or two of the following tests:
  - Pressure Leak Test from 0.02 cc/min to 500 psig
  - Constriction or Blockage Flow Test, up to 5% part diameter constriction
- One or Two Independent Test Channels
- Testing up to two sets of parts independently
- Sort function- testing multiple parts and sorting the rejects (Applicable as the IGLS measurement is not volume sensitive!)
- Large volume parts, complex parts and short cycle time
- Custom options
- Cleanroom or industrial application
- User friendly Operator Interface for stand alone applications



Features

- Micro flow sensor- Intelligent Gas Leak Sensor (IGLS)
- Single or Dual test channels with one or two of the following:
  - Leak Test Channel Pressure testing: Automated test with large volume Quick-Fill features.
  - Constriction/Blockage Flow channel with Intelligent Gas Flow Sensor (IGFS) and unique pressure control.
- Optional Sort test controller: Leak Test multiple parts, and sorting out the rejected parts
- For Each Test Channel:
  - Built in Verification Orifice and valve
  - Character Display Interface
  - Digital and analog I/O Interface
  - Ethernet or serial Interface for each test channel
- Ethernet connection
- Stainless steel enclosure for cleanroom

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Leak Test Instruments

MODEL IPE2

APPLICABLE MICRO-FLOW SENSORS (IGLS)

Pressure Leak Test Models: IL2-C and IL2-L

Flow/Constriction/Blockage Tests: Model IF2-HF

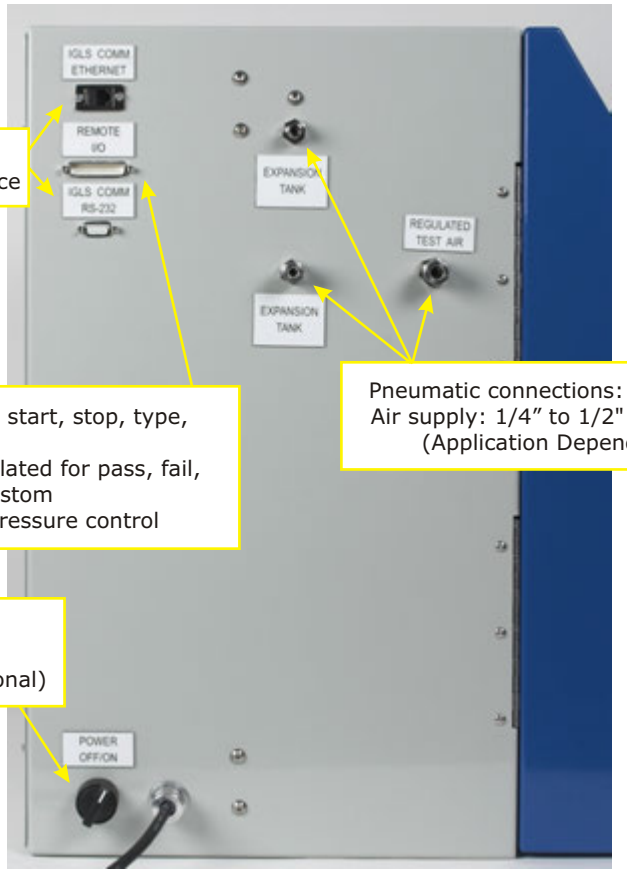
SPECIFICATIONS

Dimensions & Access

- 17''W, 24''H, 19''D (Does not include connectors & fittings)
- Instruments enclosure with front door and back panel
- Expansion tank and pressure regulators are externally mounted

Gases

- Dry, clean gases: air, nitrogen
- For other gases consult ATC



AVAILABLE OPTIONS

See options chart for all available options.

The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Leak Test Instruments

MODEL IPE-HP

Instrument Applications

- High Pressure Leak Test from 0.05 cc/min and pressure to 2100 psig
- One or Two Independent Test Channels
- Testing up to two set of parts independently
- Sort function - testing multiple parts and sorting the rejects (Applicable as the IGLS measurement is not volume sensitive!)
- Small volume parts, medium leak tightness, fast cycle time
- Custom options

Features

- Micro-Flow Sensor - Intelligent Gas Leak Sensor (IGLS)
- Single or Dual test channels
- Automatic HIGH PRESSURE test circuit for each channel
- Stainless steel, high pressure test circuit
- Optional Sort test controller: Leak Test multiple parts, and sorting out the rejected parts
- For Each Test Channel:
  - Built in Verification Orifice and valve
  - Character Display Interface
  - Digital and analog I/O Interface
  - Serial Interface

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Leak Test Instruments

MODEL IPE-HP

APPLICABLE MICRO-FLOW SENSORS (IGLS)

Model: IL2-HP

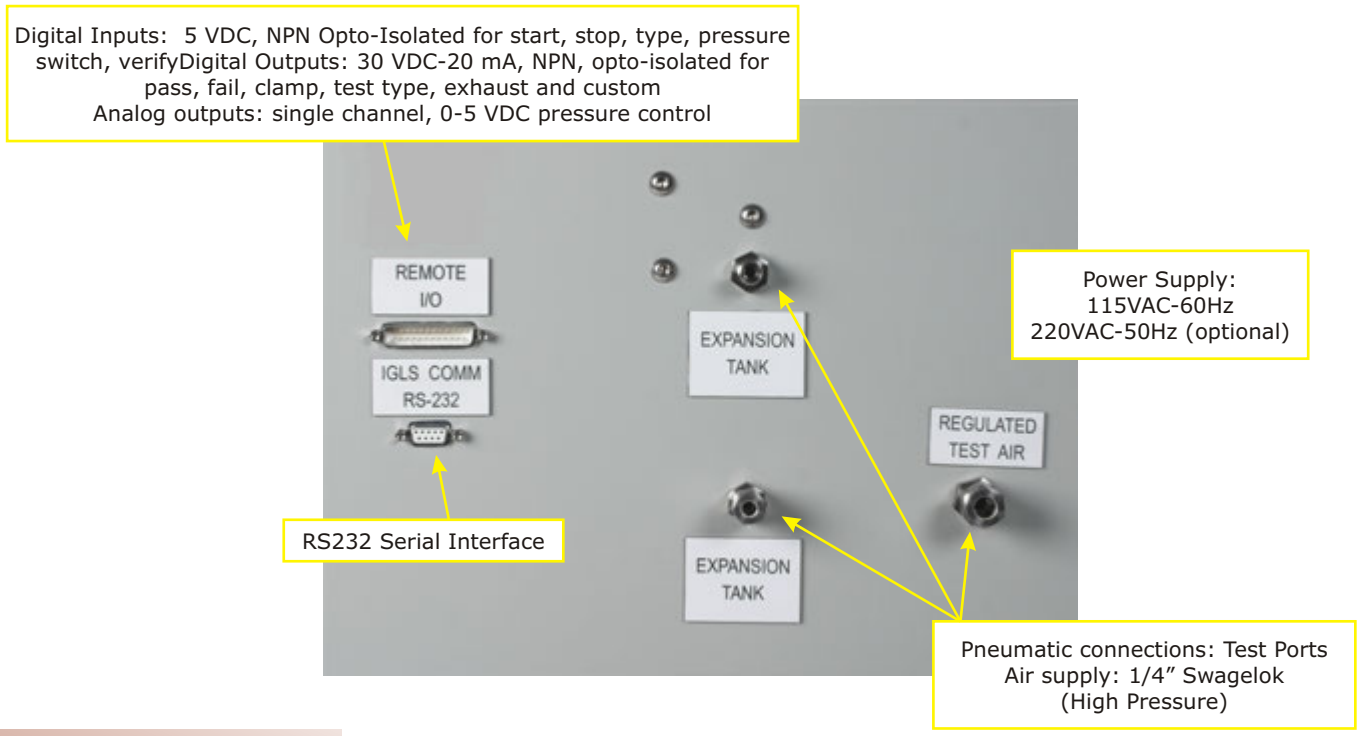
SPECIFICATIONS

Dimensions & Access

- 24''W, 23''H, 12''D (Does not include connectors & fittings)
- Dual access doors, NEMA 12 instrument enclosure
- Expansion tank and pressure regulators are externally mounted

Gases

- Dry, clean gases: air, nitrogen
- For other gases consult ATC



AVAILABLE OPTIONS

See options chart for all available options.

The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Leak Test Instruments

MODEL ME2

Instrument Applications

- Leak testing under vacuum
  - Slip and viscous flow regime (2 psia to barometric pressure)
  - Leak Tightness from $1x10^{-5}$ sccs at 2 psia (1 μm defect size)
    Or
  - Hard vacuum - Molecular Flow (less than 0.1 psia)
  - Leak Tightness from $5x10^{-7}$ sccs at 0.02 psia (0.1 μm defect size)
- Mass Extraction tests
- Medium size parts, higher throughput
- Cleanroom or industrial applications

Features

- Micro-Flow Sensor - Intelligent Gas Leak Sensor (IGLS)
  Or
- Molecular Flow Sensor- Intelligent Molecular Leak Sensor (IMFS)
- Automated VACUUM test circuit, uniquely designed for ultra-tight leak specification
- Built in Balance and Quick Evacuation circuits
- Front graphical display with TOUCH screen
- Built in Verification Orifice
- Digital and analog I/O Interface
- Ethernet, Serial Interface
- Stainless steel enclosure for clean room
- Oil-less various sizes, vacuum generation and control packages
- Optional test cart with vacuum generation and control package

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Leak Test Instruments

MODEL ME2

APPLICABLE MICRO-FLOW SENSORS (IGLS)

Vacuum Sensor: Model IL2-M, calibrated from 2 psia (slip and viscous flow regimes)

Hard Vacuum Sensor: Model IMFS calibrated from 0.01 to 0.2 psia (Molecular and transitional flow regimes)

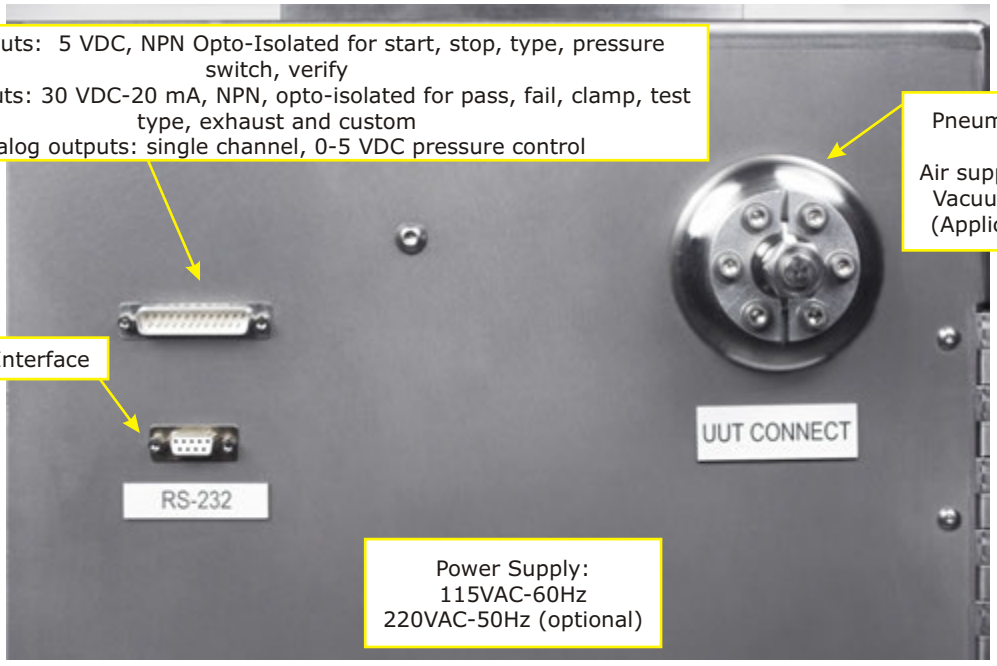
SPECIFICATIONS

Dimensions & Access

- 17''W, 24"H, 19"D (Does not include connectors & fittings)
- Optional Cart Size: 28"W, 47"H, 20"D Expansion tank, vacuum generation and control package are externally mounted on optional cart

Gases

- Dry, clean gases: air, nitrogen
- For other gases consult ATC



AVAILABLE OPTIONS

See options chart for all available options.

The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Leak Test Instruments

MODEL ME2-Packaging

Instrument Applications

- Non- Destructive AIR Mass Extraction Closure Integrity testing for:
  - Pharmaceutical Blister-Packs, pouches, vials and more.
  - Beverage packaging (bottles, cans, carts etc.)
  - Food: flexible and rigid packages
- Fully automatic Leak Testing under vacuum.
- Accommodates very large defect (to detect open package)
- Large defect and fine defect test features.
- Leak Tightness from $1x10^{-5}$ sccs at 2 psia (1 μm defect size)
  Or
- Leak Tightness from $5x10^{-7}$ sccs at 0.02 psia (0.1 μm defect size)
- Clean room or industrial applications

Features

- All ME2 basic features
- Automated VACUUM test circuit, uniquely designed for ultra-tight leak spec.
- Proprietary design for very large leak detection, for head-space of 0.4 cc and larger.
- Stainless steel chamber, optimized for package type, protects package from over-expansion.
- Ergonomic design, manual or fully automated parts loading/unloading.
- Rugged design, very simple to operate.
- Includes SS Vacuum chambers and test cart
- Pass/Fail, with automated test data acquisition
- Micro flow sensor - the Intelligent Gas Leak Sensor (IGLS)

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Advanced Test Concepts
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Leak Test Instruments

MODEL ME2-Packaging

APPLICABLE MICRO-FLOW SENSORS (IGLS)

Vacuum Sensor: Model IL2-M, calibrated from 2 psia (slip and viscous flow regimes)

Hard Vacuum Sensor: Model IMFS calibrated from 0.01 to 0.2 psia (molecular and transitional flow regimes)

Very Large leak detectors (available only for this product)

SPECIFICATIONS

Dimensions & Access

- 17''W, 24"H, 19"D (Benchtop size does not include connectors, fittings or chamber)
- Optional Cart Size: 28"W, 47"H, 20"D
  - Vacuum Chamber: Stainless steel with volume fillers/flexible part support
  - Expansion tank, vacuum generation and control package are externally mounted on optional cart

Gases

- Dry, clean gases: air, nitrogen
- Non-corrosive to stainless steel
- For other gases consult ATC

AVAILABLE OPTIONS

See options chart for all available options.

The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Leak Test Instruments

MODEL ME3

Instrument Applications

- In-Line high speed Container Closure Integrity testing using ATC's Mass Extraction technology (vacuum)
- Multiple instruments for high speed production lines (up to 120 parts/hour)
- Slip and viscous flow regime (2 psia to barometric pressure)- Leak Tightness from 1X10-4 sccs at 2 psia; or
- Hard vacuum - Molecular Flow (less than 0.1 psia)- Leak Tightness from 5X10-6 sccs at 0.02 psia
- Mass Extraction tests at lower instrument cost compared to off-line tests.
- Cleanroom or industrial applications
- Ethernet interface to simplify integration.

Features

- Designed to be part of a rotary or linear continuous operation system
- Micro-Flow Sensor - The Intelligent Gas Leak Sensor (IGLS); or
- Molecular Flow Sensor - The Intelligent Molecular Leak Sensor (IMFS)
- Automated vacuum test circuit, uniquely designed for ultra-tight leak test
- High speed evacuation circuit, for in-line process testing, where short test time are required
- Large leak and fine leak tests
- Stainless steel enclosure with measurement circuit- can be part of a moving station (eg. dial table, up and down movements)
- Displays real time of pressure, flow test messages
- Separate controller box can support up to 5 instruments
- Slave to a remote PLC/PC
- Ethernet IP interface

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Leak Test Instruments

MODEL ME3

APPLICABLE MICRO-FLOW SENSORS (IGLS)

Vacuum Sensor: Model IL2-M, calibrated from 2 psia (slip and viscous flow regimes)

Hard Vacuum Sensor: Model IMFS, calibrated from 0.01 to 0.2 psia (Molecular and transitional flow regimes)

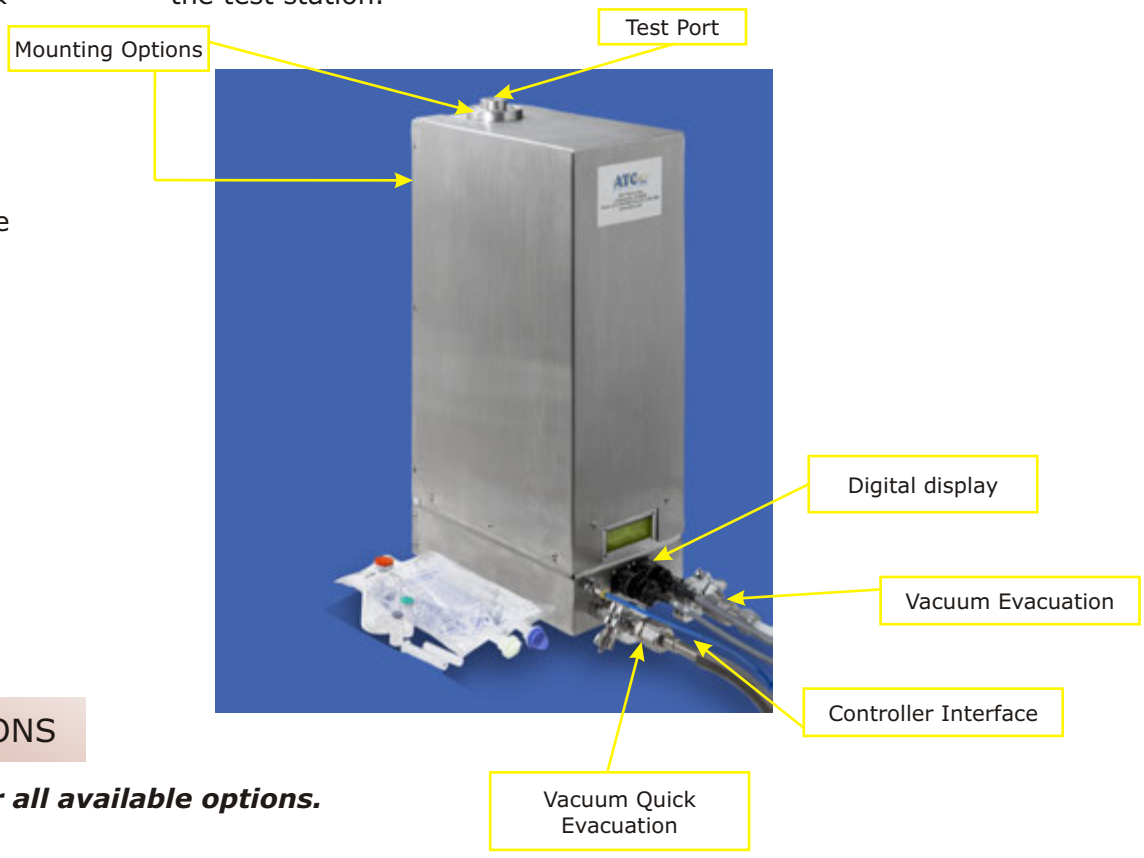
SPECIFICATIONS

Dimensions & Access

- 6 3/4" x 11 1/8" x 22 1/4" (Does not include connectors & fittings)
- Remote Control Enclosure (controls up to five instruments)
- Data output: Ethernet IP Interface
- Digital/Control output- pass; fail; start; stop- test types and more via digital I/O Ethernet IP protocol
- Quick evacuation output options for shorter test time
- Has the capability to rotate and/or move up and down with the test station.

Gases

- Dry, clean gases: air, nitrogen
- For other gases consult ATC



AVAILABLE OPTIONS

See options chart for all available options.

The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Leak Test Instruments

AVAILABLE OPTIONS BY MODEL

Options	Description	E	E2	VE	VE2	IPE	IPE2	IPE-HP	ME2	ME3
1	Leak-Tek © Program, site license	✓	✓	✓	✓	✓	✓	✓	✓	✓
1A	Adaptive Test PC Set Up Tools	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Electronic pressure controller	✓	✓			✓	✓			
3F	Automatic Pressure Controller (for constriction/blockage tests)					✓	✓			
4	Expansion tank - small/medium size parts	✓	✓	✓	✓	✓	✓	✓	✓	✓
4B	Expansion tank - large volume parts		✓			✓	✓			
5A	Precision Pressure Regulator Small and Medium parts	✓	✓			✓	✓			
5B	High Volume Parts-High Flow Precision regulator		✓			✓	✓			
6	Verification Orifice (ECD/ECS) and valve	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	Remote Exhaust and in-line filter	✓	✓	✓	✓				✓	✓
8	Pre-fill option for large volume part tests					✓	✓			
11	P-Drop Test (for gross blockage test)	✓	✓			✓	✓			
12A	Oil-Less Vacuum Generation and control package 4 psia to -0.1 psi vacuum, small parts.			✓	✓	✓			✓	✓
12B	Oil-Less Vacuum Generation and control package 2 to 10 psia, small parts.			✓	✓	✓			✓	✓
14	Remote pendant with start/stop buttons, 6' cord	✓	✓	✓	✓	✓	✓	✓	✓	✓
15	Additional Interface Connector with screw terminals					✓	✓		✓	✓

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MICRO-FLOW SENSORS

Sensor Model No.	Minimum Flow Range	Maximum Flow Range	Pressure Range (psia)	Applicable for Instruments Models:
IL2-C	0-1 cc/min	0-500cc/min	2-500	E,VE;E2;VE2;IPE,IPE2,ME2
IL2-L	0-1 lit/min	0-25 lit/min	Atm-100	IPE;IPE2
IL2-M	0-0.025 cc/min*	0-0.9 cc/min	2-24	E;VE;E2;VE2;IPE;IPE2; ME2; ME3
IL2-HP	0-1 cc/min	0-25 cc/min	Atm-2100	IPE-HP
IMFS	0-1 g/min**	0-400 g/min	0-0.2	ME2; ME3
IF2-HF	0-50 lit/min	0-10,000 lit/min	Atm-100	IPE,IPE-2, blockage tests

* 0.025 cc/min at 2 psia is 5.6×10^{-5} std. cc/sec
** Lowest capable measurement: 0.05 µg/min of nitrogen is 6×10^{-7} std. cc/sec

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Micro-Flow Sensors

MODEL: IL2-C AND IL2-L

Product Applications

- Pressure leak testing
- Leak Rates: 0.03 cc/min to 25 LPM

Product Features

- Intelligent Gas Leak Sensor (IGLS)
- Measures volume flow - using ATC's patented **ALF** design
- Measures absolute downstream pressure and temperature
- Stainless steel rugged construction
- No moving parts
- No over-flow sensitivity

NOTE: The IGLS is a part of ATC's complete leak test instruments, portable unit, or part of a larger automated test system. The micro-flow sensor is not available by itself.

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Micro-Flow Sensors

MODEL: IL2-C AND IL2-L

FLOW RANGE

0-1; 0-3; 0-5; 0-10; 0-25; 0-50; 0-100; 0-250; 0-500 cc/min (mL/min)
0-1; 0-5; 0-25 LPM (L/min)
Sensor Type: Accelerated Laminar Flow (ALF)
Measurement Uncertainty: +/- 1% (0.6% optional) of reading, calibrated range

PRESSURE RANGE

0-15; 30;100;250; (psi-absolute)
Type: Absolute, micro-machined
Measurement Uncertainty: 0.2% of Full Scale (FS)
Maximum over Pressure: 1.2 times full range/scale

TEMPERATURE RANGE

Operating and Calibrated: 10 to 45 °C
Storage: -25 to 50 °C
Sensor Type: RTD 100 Ohms
Measurement uncertainty at calibrated range: 0.5 °C

RESOLUTION

16 bits A/D and 16 bits D/A

INTERFACE

Serial port
Digital I/O: Start/Stop, type clamp and more...
Analog I/O
Power: 115 or 220 VAC, single phase
Optional: 2-line character display

MAX DIFFERENTIAL PRESSURE

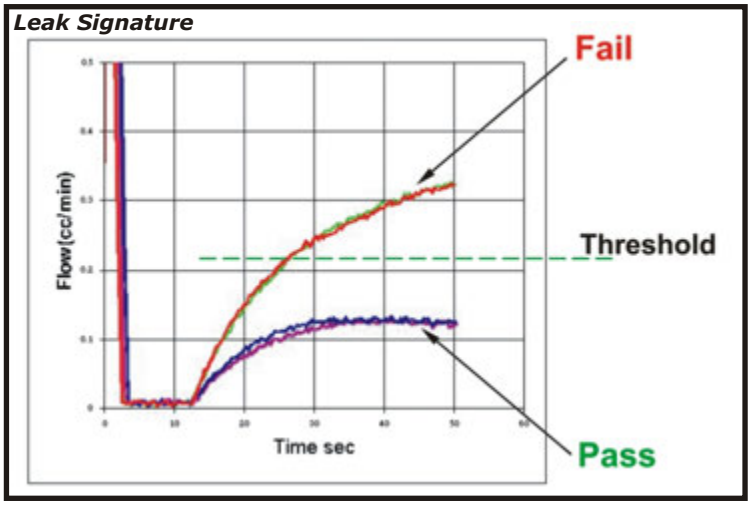
500 psid (DP) or max. range of pressure sensor, whichever is smaller.

GASES USED

Use dry non-condensing and clean gases
Air, Nitrogen, Helium, Argon, & Carbon Dioxide
Other Gases Available, consult ATC.

RESPONSE TIME

Step function: from no flow to full range - 50 ms or less
Sensor only, no volume



The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Micro-Flow Sensors

MODEL: IL2-M

Product Applications

- 2 psia to 24.5 psia (mild vacuum to low pressure)
- Leak Rates: $1x10^{-5}$ sccs at 2 psia
- Used for Mass Extraction applications
- Can be used for applications with low positive pressure and tight leak specification
- Detection of 2 micron defects or larger

NOTE: The IGLS is a part of ATC's complete leak test instruments, portable unit, or part of a larger automated test system. The micro-flow sensor is not available by itself.

Product Features

- Intelligent Gas Leak Sensor (IGLS)
- Measures volume flow - using ATC's patented **ALF** design
- Measures absolute downstream pressure and temperature
- Stainless steel rugged construction
- No moving parts
- No over-flow sensitivity
- Measurement units select by user, typically mm^3/min (µL/min)
- Lowest capable measurement, $1x10^{-6}$ sccs at 2 psia

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Micro-Flow Sensors

MODEL: IL2-M

FLOW RANGE

0-25; 0-50; 0-100; 0-250; 0-500; 0-990 mm^3/min (micro liters/min)
Sensor Type: Accelerated Laminar Flow (ALF)
Measurement Uncertainty: +/- 2% of reading (1% optional), calibrated range

PRESSURE RANGE

0-15; 30; (psi-absolute)
Type: Absolute, silicon micro-machined
Measurement Uncertainty: 0.2% of Full Scale (FS)
Maximum over Pressure: 1.2 times full range/scale

TEMPERATURE RANGE

Operating and Calibrated: 10 to 45 °C
Storage: -25 to 50 °C
Sensor Type: RTD 100 Ohms
Measurement uncertainty at calibrated range: 0.5 °C

RESOLUTION

16 bits A/D and 16 bits D/A

INTERFACE

Serial port
Digital I/O: Start/Stop, type clamp and more...
Analog I/O
Power: 115 or 220 VAC, single phase

MAX DIFFERENTIAL PRESSURE

Maximum 10 psi, differential

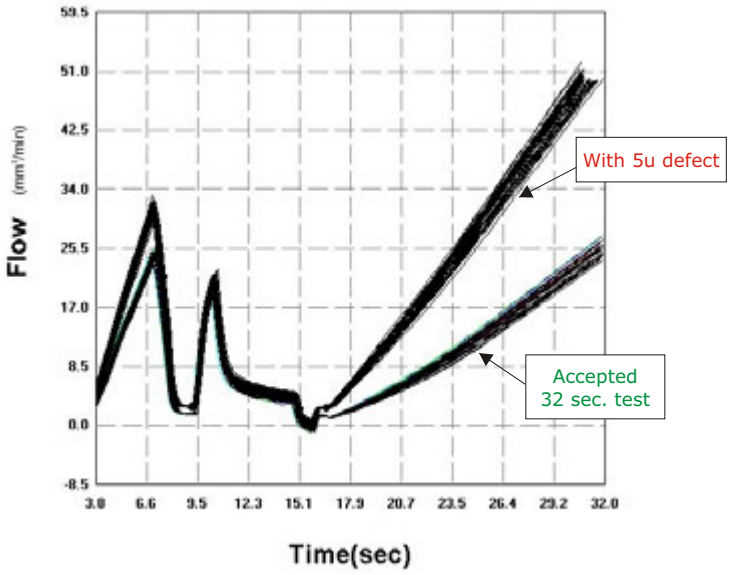
GASES USED

Use dry non-condensing and clean gases
Air, Nitrogen, Helium, Argon, & Carbon Dioxide
Other Gases Available, consult ATC.

RESPONSE TIME

Step function: from no flow to full range - 50 ms or less
Sensor only, no volume

MASS EXTRACTION TESTS - Multiple Runs with and without a 5 micron defect.



The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Version 1.23

Micro-Flow Sensors

MODEL: IL2-HP High Pressure

Product Applications

- HIGH PRESSURE Applications
- Range: 500-2200 psig
- Leak Rates: 0.05-2 cc/min

Product Features

- Intelligent Gas Leak Sensor (IGLS)
- Measures volume flow - using ATC's patented **ALF** design
- Stainless steel rugged construction
- No moving parts
- No over-flow sensitivity
- Max. Differential Pressure: Up to 500 psi DP

NOTE: The IGLS is a part of ATC's complete leak test instruments, portable unit, or part of a larger automated test system. The micro-flow sensor is not available by itself.

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Micro-Flow Sensors

MODEL: IL2-HP High Pressure

FLOW RANGE

0-1; 0-3: 0-5; 0-10; 0-25 cc/min (mL/min)
Sensor Type: Accelerated Laminar Flow (ALF)
Measurement Uncertainty: +/- 2% of reading, calibrated range

PRESSURE RANGE

0 TO 500; 1000; 2200 (psi-absolute)
Type: Absolute, micro-machined
Measurement Uncertainty: 0.3% of Full Scale (FS)
Maximum over Pressure: 1.2 times full range/scale

TEMPERATURE RANGE

Operating and Calibrated: 10 to 45 °C
Storage: -25 to 50 °C
Sensor Type: RTD 100 Ohms
Measurement uncertainty at calibrated range: 0.5 °C

RESOLUTION

16 bits A/D and 16 bits D/A

INTERFACE

Serial port
Digital I/O: Start/Stop, type clamp and more...
Analog I/O
Power: 115 or 220 VAC, single phase

MAX DIFFERENTIAL PRESSURE

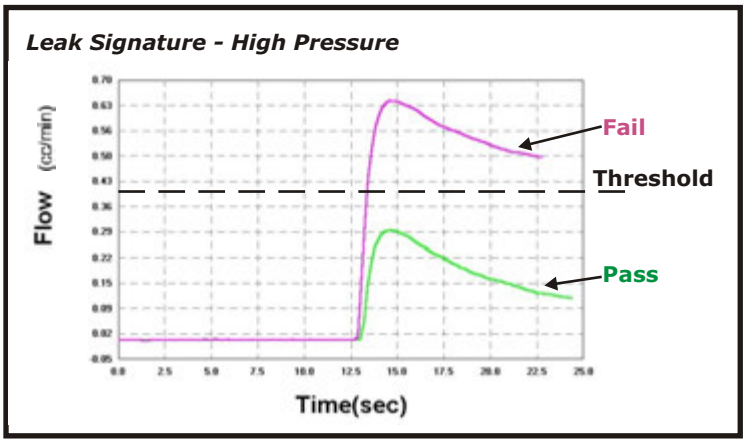
500 psid (DP) or max. range of pressure sensor, whichever is smaller.

GASES USED

Use dry non-condensing and clean gases
Air, Nitrogen, Helium, Argon, & Carbon Dioxide
Other Gases Available, consult ATC.

RESPONSE TIME

Step function: from no flow to full range - 50 ms or less
(Open outlet, dependent on sensor range)



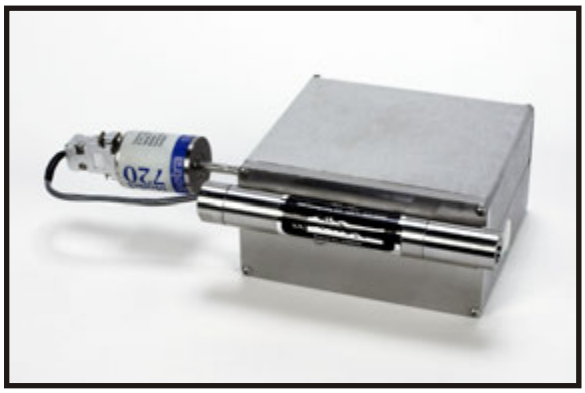
The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Micro-Flow Sensors

MODEL: IMFS

Product Applications

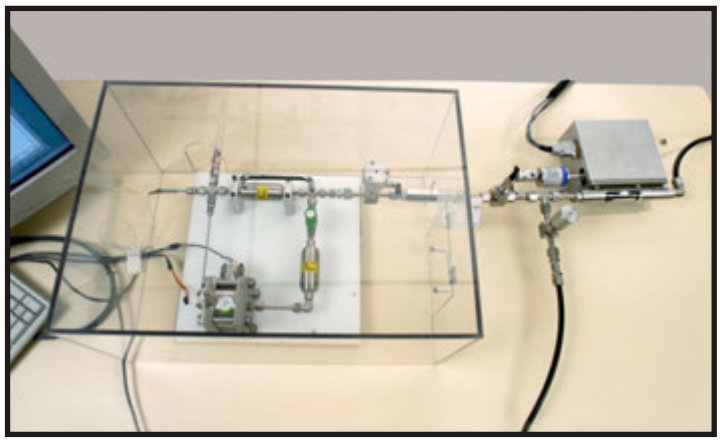
- Mass Extraction at vacuum under 0.2 psia (hard vacuum)
- Leak Detection of 0.1 to 0.2 micron defects
- AIR Measurements from $5x10^{-7}$ sccs
- Intelligent Molecular Flow Sensor - operates mostly in transitional and molecular flow regimes



NOTE: The IGLS is a part of ATC's complete leak test instruments, portable unit, or part of a larger automated test system. The micro-flow sensor is not available by itself.

Product Features

- Intelligent Molecular Flow Sensor - Operates mostly in transitional and molecular flow regimes
- Measures MASS Flow, using ATC's patented ALF design
- Measures hard vacuum to 15 psia
- Rugged, stainless steel construction
- No moving parts



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Micro-Flow Sensors

MODEL: IMFS

FLOW RANGE

0-1;0-2.5;0-5;0-10;0-100;0-400 micrograms/min
Measurement uncertainty: +/- 5 % (2% optional) of reading, calibrated range

PRESSURE RANGE

0-0.2 or 0-15 (psi-absolute)
Type: Absolute, capacitance
Measurement uncertainty: 0.25% of FS

TEMPERATURE RANGE

Operating and Calibrated: 10 to 45 °C
Storage: -25 to 50 °C
Sensor Type: RTD 100 Ohms
Measurement uncertainty at calibrated range: 0.5 °C

RESOLUTION

16 bits A/D and 16 bits D/A

INTERFACE

Serial port
Digital I/O: Start/Stop, type clamp and more...
Analog I/O
Power: 115 or 220 VAC, single phase

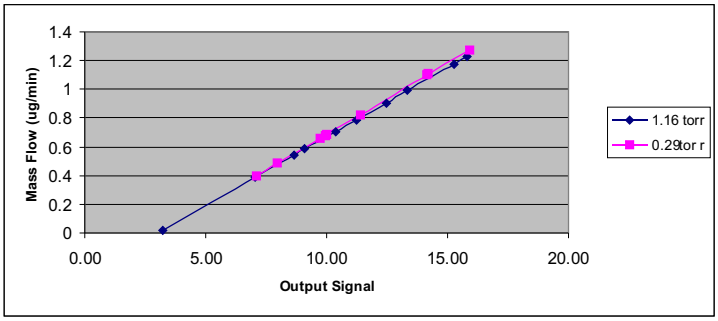
MAX DIFFERENTIAL PRESSURE

0.02 psid

GASES USED

Use dry non-condensing and clean gases
Air, Nitrogen, Helium, Argon, & Carbon Dioxide
Other Gases Available, consult ATC.

Transitional/Molecular Flow-IMFS2 mass flow vs. Output Signal
Note: 0.05 micro-gram/min N2 = 6.9 e^{-7} atm-cc/sec @ 20 °C



The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Micro-Flow Sensors

MODEL: IF2-HF

Product Applications

- ***High Flow*** measurements 25 to 10,000 LPM
- Constriction/Blockage testing
- Precision Transfer Standard to calibrate other flow meters
- Measurement of gas mixtures, hydrogen and natural gas options
- Pressure range from barometric to 100 psig

Product Features

- Intelligent Gas Flow Sensor (IGFS)
- Measures volume flow, pressure and temperature
- Optional compensation for various gas properties, temperature and viscosity
- Dual range calibration, automatic range switching
- Automatic pressure set and control option (constriction/blockage test)
- Stainless steel rugged construction
- No moving parts
- Not overflow sensitive

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Micro-Flow Sensors

MODEL: IF2-HF

FLOW RANGE

0-50; 0-100; 0-300;0-500;0-1000;0-5000;0-10,000 LPM (L/min)
Sensor type: Laminar Flow Type, multiple designs.

Leak Flow Measurement Uncertainty: +/- 1% (0.6% optional) of volumetric flow, calibrated range

PRESSURE RANGE

From Barometric pressure to 15; 30; 100 (psi-absolute)
Type: Absolute, micro-machined sensor
Measurement uncertainty: 0.2% of Full Scale (FS)
Maximum over pressure: 1.2 times full range/scale

Burst Pressure: 1000 psia

RESOLUTION

16 bits A/D and 16 bits D/A

MAX DIFFERENTIAL PRESSURE

100 psid (differential pressure) or maximum range of pressure sensor, whichever is smaller.

GASES USED

Dry non-condensing clean air.
Other gases (Nitrogen, Hydrogen, Natural Gas, Carbon Dioxide, moisturized air available, consult ATC)

RESPONSE TIME

Step function from no flow to full range: 50 ms or less (open outlet, dependent on sensor range).

TEMPERATURE RANGE

Operating and calibrated range: 10 to 45 °C (other ranges available, consult ATC)
Storage: -25 to 50 °C
Sensor type: RTD 100 Ohms
Measurement uncertainty at calibrated range: 0.5 °C

INTERFACE

Serial port
Digital I/O: Start/stop, pass/fail and more…
Programmable Analog Output
Power: 115 VAC or 220 VAC (power supply and connector included)

The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Accessories - Equivalent Channels

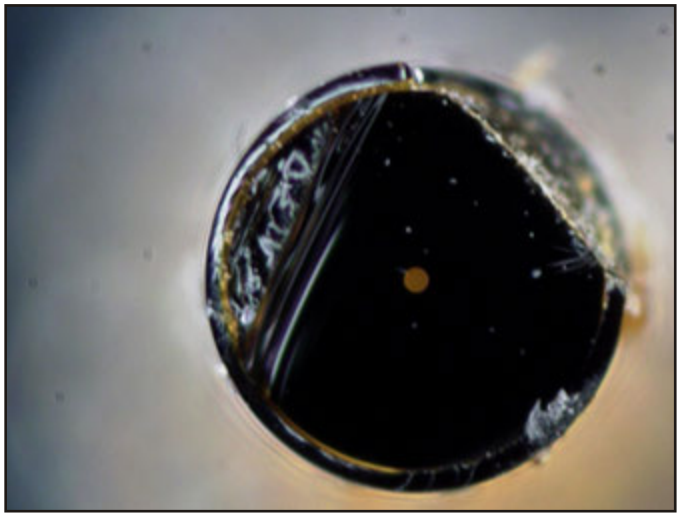
Equivalent Channel Diameter (EC)
Calibrated Micro-Flow/Leak Device Micro-Flow Channel

Meets the requirements of US-CAR, SAE J2045, SAE J2587 for US-CARB LEV II+PZEV, EURO-5 Hydrocarbon Emission Standards and Major OEM's specifications.

<u>Geometric Definition of Leak Tightness</u> - Simple and Unambiguous Specification

- **Complete**
  - **independent of:**
    - ***Test type*** ***Location*** ***Temperature*** ***Pressure*** ***Test fluid***

Cross Section of 15 Micron Equivalent Channel



Equivalent Channel Standard (ECS)

- Micro channel - L/D > 100
- Certified Diameter Roundness +/- 0.5 micron
- Flow measured at test pressure
- Silica and Stainless Steel

Equivalent Channel Diameter (ECD)

- Micro channel - L/D > 100
- Calibrated to gas flow rate at inlet and outlet pressure
- Diameter and length derived from flow rate

These products are available and are assembled using advanced micro-fabrication technologies. The ECD/ECS are constructed from Silica (glass) and encapsulated in stainless steel housing. Our unique manufacturing process ensures a uniform and smooth diameter.

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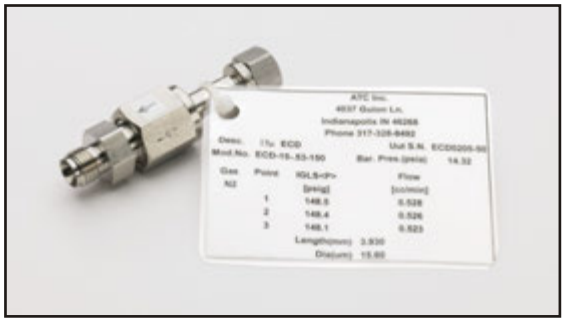
Accessories - Equivalent Channels

Equivalent Channel Diameter (EC)
Calibrated Micro-Flow/Leak Device Micro-Flow Channel

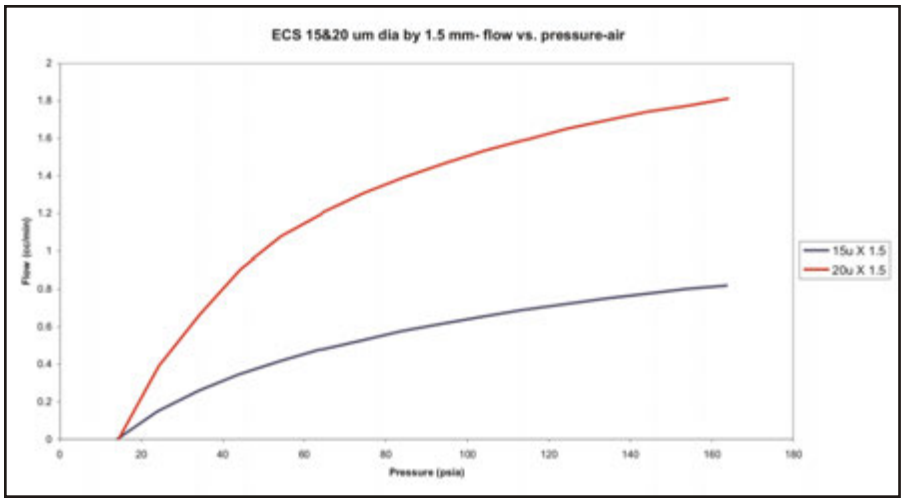


Each ECS is supplied with traceable gaging certificate of the inlet diameter, outlet diameter and minimum length in order to confirm the above mentioned spec.

Each ECD is certified for flow rate with air/nitrogen or other gasses per customer request (standard 3 points, Air/Nitrogen, Barometric outlet, others available).

Specification:

Leak Flow Rate (ECD only) +/- 5% of nominal value
Available diameter: 2; 5; 10; 20; 30; 40 mm (micro-meters, micron)
Length: From 1.25 mm to 5 mm
Note: Diameter roundness and tolerance is +/- 5% or +/- 0.53 micron, whichever is larger



Notes:

1.0 Leak flow is measured in **ACTUAL** cc/min, pressure in **ABSOLUTE** pressure psia. Both are measured upstream (inlet) to the orifice.
2.0 Flow rate and EC sizes are used for reference only. Actual value may change from EC to EC
3.0 The enclosed data is *NOT* applicable to vacuum applications.

Consult ATC Inc. Mass Extraction specification sheet for vacuum applications.

The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Accessories - Equivalent Diameters

Equivalent Diameter (ED)
Sharp Edge Orifice - SE

- Glass Orifices
- Sapphire Orifices

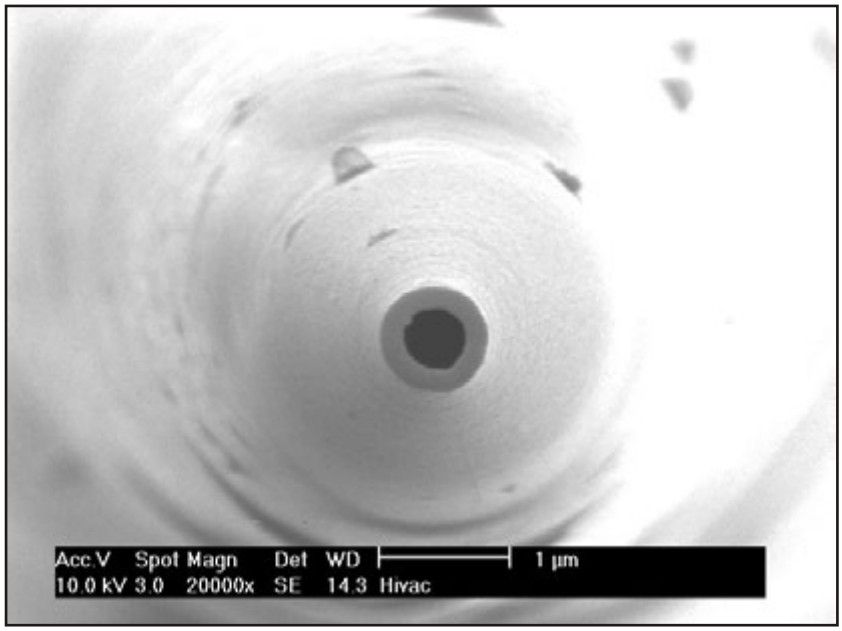
Sharp Edge (SE) orifices also known as Equivalent Diameters have a Length/Diameter (L/D) ratio that is significantly lower than Equivalent Channels.

Sapphire and Glass orifices offer exceptional long term geometric consistency due to their hardness and excellent stability (low temp. expansion coefficients). The orifices are encapsulated in stainless steel housing.

<u>Geometric Definition of Leak Tightness</u> - Simple and Unambiguous Specification

- **Complete**
  - **independent of:**
    - ***Test type*** ***Location*** ***Temperature*** ***Pressure*** ***Test fluid***

Glass Orifice - Scanning Electron Microscope Tip image, Diameter: 0.4 micrometer



These products are assembled using advanced micro-fabrication technologies.

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Accessories - Equivalent Diameters

Calibrated Leak - Verification Orifice - SE

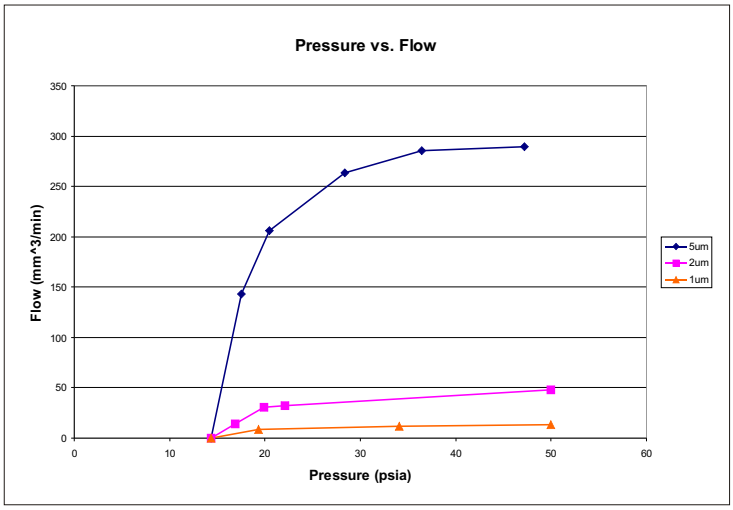
Glass Orifices & Sapphire Orifices

Each orifice is supplied with:

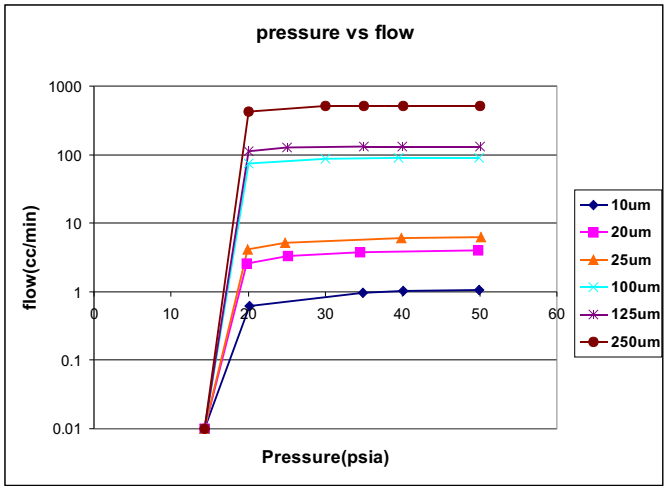
- A filter, as part of a Leak Test Instrument
- A calibration certificate, NIST traceable
- 1/4” Swagelok female connection

Independent pressure tank is required for stand alone orifices, with controlled pressure range.

Glass Orifice - Typical Performance Curves



Sapphire Orifice - Typical Performance Curves



Notes:

1.0 Leak flow is measured in **ACTUAL** mm^3/min or cc/min, pressure in **ABSOLUTE** pressure psia. Both are measured upstream (inlet) to the orifice.
2.0 Flow rate and orifice sizes are used for reference only. Actual value may change from orifice to orifice
3.0 The enclosed data is *NOT* applicable to vacuum applications.

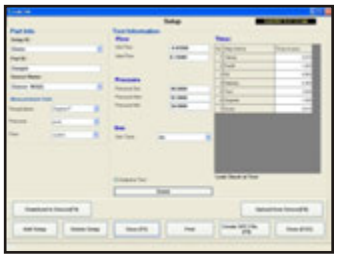
Consult ATC Inc. Mass Extraction specification sheet for vacuum applications.

The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Accessories - Leak-Tek© Program

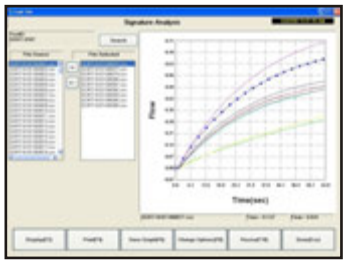
Leak-Tek©: A PC-Based Data Acquisition Program

The Leak-Tek© program, provides the user a MS-Windows™ based program to perform data collection, IGLS set up and calibration. An RS232 connection is used for communication using a USB to RS232 cable. Leak-Tek© 5.0 has an optional RJ45 for Ethernet interface. Minimum PC requirement is Windows XP Professional Version. Following are some of the program screens:



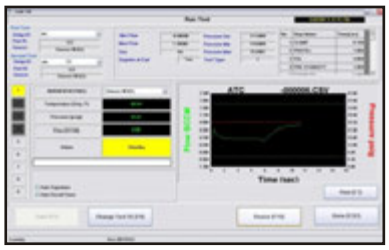
Set Up Screen

Set up and retrieval of multiple test sequences and parameters for various part numbers. Therefore, a quick change over for short runs is accomplished. Test parameters are stored in the IGLS non-volatile memory. Program can interface to multiple IGLS units (up to 10) which operate independently.
Specifying mass, volumetric units, or flow at std. condition of measurement triggers the IGLS flow computer to calculate density based on gas type, pressure and temperature. English or metric units available. User selects one of 27 flow unit combinations such as ccm, lpm, cu-in/min, cu-ft/min, sccm, slm, gr/min, oz/min. Available absolute pressure units: psia, kpa, mm-Hg, in-water. Available temperature units are °F and °C.



Signature Analysis Screen

The run test screen enables the user to connect a PC to the IGLS for automatic or manual test data saving. A green or red window indicates pass/fail. If multiple IGLS units are connected, and auto-save option is selected, all units' test results will be saved. Signatures of leak flow vs. time can be captured.



Run Screen

The reporting function includes a summary report per part number, and statistical analysis (X-bar, R-chart). Control limits are calculated. Data and graph of current or previous test runs can be viewed.

Reporting Screen

ATC Inc.
Advanced Test Concepts

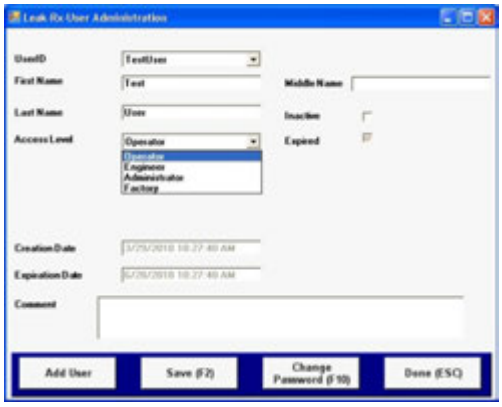
Phone: (317) 328-8492 ▪ Fax: (317) 328-2686 ▪ www.atcinc.net

Accessories - Leak-R_x © Program

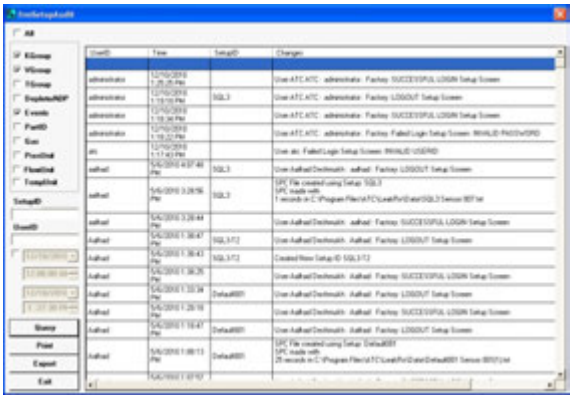
Leak-R_x ©, a MS-Windows based program developed at ATC, is a **US-FDA 21CFR Part 11** compliant version of the **Leak-Tek** © software. **Leak-R_x** is setup with a protected database and is essentially a user friendly data acquisition, analysis and monitoring platform that tracks user actions within the software. **Leak-R_x** is a program that can only be used to configure sensors that are coupled to the software with an encrypted Key. The following screens are some of the 21CFR Part

Account Setup: User Account Setup features include account expiration date, Enabling/Disabling accounts, access level permissions and unique combination of user names and passwords.

Account Administration



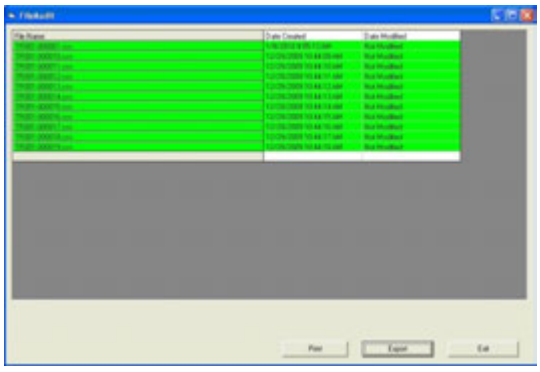
Audit Trail Query Builder



Audit Trail:

- The **Leak-R_x** software logs time stamped user actions and sensor parameter changes.
- The Audit Trail Query builder is an intuitive, easy to use tool that allows users to view the audit trail by Parameter Type, Time Stamp, Setup ID, User ID or Sensor SN.
- A separate Audit Trail is maintained for each screen in **Leak-R_x**

File Validity



Signature File Validation: Software warns the user if any data file (signature file) selected for viewing has been tampered with or altered.

Time Stamped Records Export: All critical information from the software screens can be exported/printed with a Time Stamp and User Name.

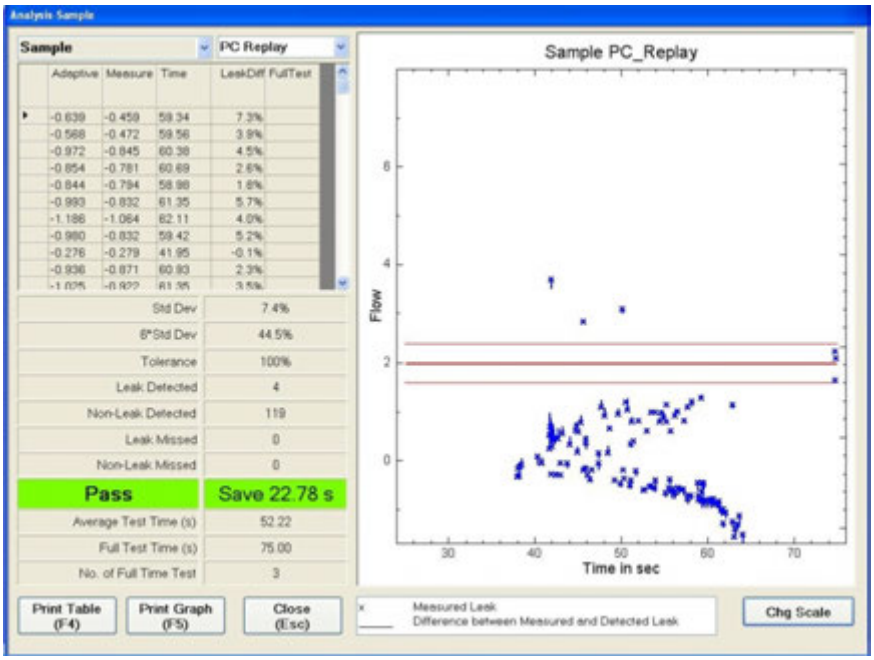
The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing

Accessories - Adaptive Test

Adaptive Test and Set Up Tools

What is Adaptive Test?

ATC's patented Adaptive Test feature enables the IGLS to learn parts signature and dynamically accepts or rejects the unit under test based on statistical consideration. The Intelligent Gas Leak Sensor (IGLS) adapts by learning the behavior of a group of parts, using statistical functions to accept or reject a part in real time. By anticipating the part's behavior, the IGLS can determine the pass or fail status of the part before the test is completed or continues with the test if the part is marginal. This feature further reduces average cycle time, making the cycle time significantly shorter by 25-40% which increases the throughput.



Adaptive Test Report Screen

PC requirements and Communication are the same as Leak-Tek© option.

Note: The Adaptive Test should only be performed by trained users or ATC's application engineers. The benefits of Adaptive Test Feature are application dependent.

ATC Inc. Advanced Test Concepts

Phone: (317) 328-8492 ▪ Fax: (317) 328-2686 ▪ www.atcinc.net

ATC Inc.
ADVANCED TEST CONCEPTS

HEADQUARTERS - USA
4037 Guion Lane | Indianapolis, IN 46268
Ph: (317) 328-8492 | Fax: (317) 328-2686
Email: atc@atcinc.net | Website: www.atcinc.net
Toll Free: (866) 282-4621| (866) ATC-INC1

LOCATIONS

Mexico
Av. Batallon de San Patricio 109 Piso 19
Col. Valle Oriente
San Pedro Garza Garcia
Nuevo Leon, Mexico CP 66269
Phone: +52 - 814 - 780 2239
Email: bvargas@atcinc.net

ATC - Asia Pacific
Instrument Management Technology
25-219, Industrial Goods Circulating Center
294 Songrim-dong, Dong-gu, Incheon, Korea
Phone: +82 - 32 - 589 7361
Fax: +82 - 32 - 589 7362
Email: yhkim@atcinc.net

ATC - Central Europe
Advanced Technology Group (ATG), s.r.o.
Beranových 65
199 02, Prague 9 - Letnany
Czech Republic
Phone: +420 - 234 - 312 201
Fax: +420 - 234 - 312 205
Email: atg@atg.cz

ATC - China
Shanghai Hualong Test Instruments Co., Ltd.
No.389 ChuanHong Road
PuDong New Area
Shanghai 201202, China
Phone: +82 - 21 - 5859 9899
Fax: +82 - 21 - 5859 7568
Email: sale@hualong.net

ATC - India, Pvt, Ltd.
110C, 8th Cross
Bommasandra Industrial Area
Bangalore, India 560 099
Phone: +91 - 80 - 4260 4443
Fax: +91 - 80 - 4260 4433
Mobile: 98860 82182/98860 41047
Email: gh@atcinc.net; rk@atcinc.net