



## *Furness Controls*

---

Leak Detection is our Business

# History

Furness Controls was founded in 1966 by Mr J.T. Furness to manufacture ultra low range differential pressure measuring instruments based on technology developed from low frequency microphones produced in the 1940's. The company quickly developed a range of pressure decay leak detectors with un-paralleled sensitivity greatly reducing cycle times and providing dry pressure test capability to replace air under water testing. Today using modern electronics the Leak Detector product range has expanded in capability to give a choice of instruments able to tackle most applications.

Company expansion saw the start of Furness Controls U.S.A. in 1990 and Furness Controls Germany in 1995. Today Furness Controls is represented and supported in more than 30 industrialised countries around the world. Visit our Website at [Furness-Controls.com](http://Furness-Controls.com) for more information.

## Why Furness Controls?

- 30 Years experience in leak test technology
- Multiple solutions to measuring problems
- World-wide service
- Full application support
- Free product evaluation service



**valve building**



**instrument assembly**



**design**

# Leak Detection is our Business

From the worldwide headquarters in Bexhill England, the Furness Controls design team brings many new measuring instruments to the market each year. The Bexhill site has full manufacturing facilities, with assembly, test and calibration areas, a machine shop for producing critical components, such as the unique design of differential pressure transducer at the heart of every Furness Controls instrument and the leak tight valves used in leak detection systems. PCB assembly and test are carried out, before the final assembly of the complete instruments with testing and calibration in environmentally controlled conditions. Furness Controls has some of the most modern facilities for the design and manufacture of hi-tech products, meeting the needs of customer demand.

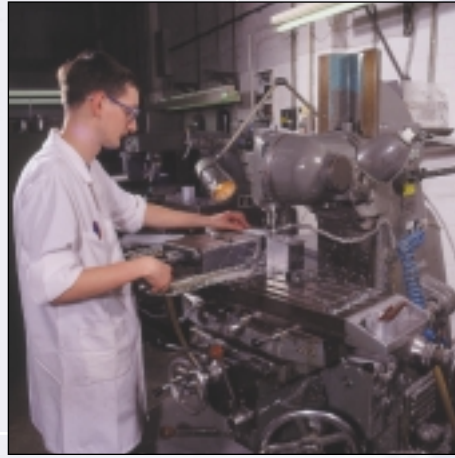
With more than 30 years experience in Leak Test technology Furness Controls provide solutions for the measurement of leakage in production components and sub-assemblies. From simple manual test stations through dedicated test stands and fully automated integrated testing systems Furness Controls have the solution. Measuring systems can be pressure decay, flow or tracer gas based. We will advise on the best solution for you. With worldwide sales and service facilities Furness Controls draws upon a huge pool of experience in giving the best advice to solve Leak test applications. Many thousands of Furness Controls instruments are in use throughout the world working for years in harsh production environments.

## **Leak Solutions**

Components and assemblies ranging from Automotive Radiators, Gas Appliances, Valves, Medical Devices and Vacuum Cleaners must be tested as "fit for purpose" during manufacture - Furness Controls can recommend and advise on the right test solution for leakage, flow rate, blockage etc. Our expertise is available to bring the right solution to the measuring problem. Everything from tooling, automation, fixturing and data collection can be provided. We work with many different companies to recommend the solution for you.



Leak Detection is our Business



**machine shop**

---



**PCB manufacturing**

---



**transducer manufacturing**

---

**InstruMetrics**  
ENGINEERING

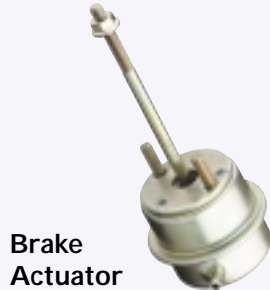


**PCB testing**

---



**Exhaust  
Manifold  
Casting**



**Brake  
Actuator**



**Cylinder Block combination dry test and underwater inspection tank with 360° fixture rotation.**

# Applications



Furness Controls have more than 30 years experience in providing solutions to leakage detection and test problems in the production and assembly areas of industry. Many components and assemblies must be tested as "fit for use" as part of the production line test process, involving the measurement and control of leakage, flow rate, opening pressure, blockage and electrical tests.

Using one of our range of instruments and test stations, Furness Controls can offer a suitable solution for your test needs.

Applications for leakage, flow and blockage detection involve the testing of many different types of parts. Below is a list of some of the items

## Automotive Sector

Cooling Radiators  
Oil Pumps  
Brake Master Cylinders  
Catalytic Converters  
Fuel Tank Non-Return Valves  
Tail Lamp Clusters  
Gearboxes  
Cylinder Head Castings  
Thermostat Housings  
Fuel Injectors  
Metal Flexible Exhaust Hoses  
Tank Level Sensors  
Fuel Pipes  
Spring Loaded Seals

Water Pumps  
Washer Bottles  
Brake Pipes  
Fuel Tanks  
Brake Hoses  
Headlamps  
Differentials  
Engine Block Castings  
Facia Ventilation Systems  
Exhaust Manifolds  
Brake Fluid Reservoirs  
Aluminium Wheel Castings  
Fuel Rails

Air Conditioning Radiators  
Brake Wheel Cylinders  
Silencers (Mufflers)  
Fuel Pumps  
Radiator Hoses  
Pneumatic Seat Suspensions  
Rear Axles  
Rocker Covers  
Carburettors  
Inlet Manifolds  
Radiator Caps  
ABS Devices  
Power Steering Racks

## Gas Appliance Industry

Gas Cookers or Stoves  
Gas Fires or Heaters  
Gas Regulators or Governors  
Gas Injectors or Jets

Gas Boilers or Furnaces  
Gas Barbeques  
Gas Meters or Counters  
Heat Exchangers

Gas Hobs  
Gas Refrigerators  
Gas Valves

## Pneumatics Industry

Pneumatic Cylinders  
Pressure Relief Valves

Control Valves  
Pneumatic Fittings

Door Closers

## Medical Devices

Catheters  
Sealed Plastic Bags  
Endosurgical Probes

Drainage Bottle/Bags  
Needles

Molded Plastic Bottles  
Filters

## Others

Water Meters or Counters  
Fountain and other Pens  
Glue Pens  
Avionic Electrical Packages

Plumbing Fittings and Valves  
Marker Pens  
Satellite LNB's

Beer Taps  
Trigger Pumps  
Electrical Connectors

In addition to leak detection Furness Controls instruments can carry out other tests at the same time. For this reason Furness Controls has not just a simple leak detector such as the FCO283 model but also the more complex FCO290 capable of carrying out "Blockage" tests, "Ramp" tests and "Coarse" tests. Additionally the FCO290 can carry out tests at more than one pressure, including vacuum. These can all be added together in a sequence to form a powerful test regime at the test station. For example, when testing a cooling radiator, it is often necessary to test at a pressure of 1.5 bar and -800 mbar of vacuum. Following this a blockage test may be carried out to ensure there is no restriction to flow through the radiator core.

When considering any component, then other aspects of the function of the part must be considered – not just leak detection. Ask the following questions.

- 1) *Does the part have a flow path through it?*
- 2) *Is there a "lift pressure" or "closing pressure" to consider?*
- 3) *Can the part be assembled without key components being present?*
- 4) *What stresses will the part be subjected to in service?*



In the first case a "blockage" test may be appropriate as part of the sequence.

In the second case "Ramp" testing could be applied.

In the third case "Coarse" testing might be useful.

In the fourth case testing at different pressure levels may be required.

As experts in Leak Detection Furness Controls are able to offer a range of solutions to measuring problems, from simple hand operated leak test stations, where just simply push connecting the part to the instrument test port is enough; to complete test stands built to handle heavy and complex assemblies such as engine castings.

Furness Controls work with a number of partner companies to provide a solution right for each application. Alternatively you may wish to design and build the test stand yourself, in which case Furness Controls will work with you to achieve the desired result. In all cases our experience and expertise will ensure success.

Many systems are built around the pressure decay leak detection instruments, but some applications may require the detection of the leakage point on the part. For this purpose a tracer type of system such as the GasTech model can be used. In some gas appliance applications, it may be necessary to measure not just leakage and flow but electrical testing too. Again Furness Controls are able to provide an integrated solution working with our specialist partners.

With our 30 years experience Furness Controls can offer a measurement solution in most cases and can consult and advise on the best ways of achieving the solution that ensures the production line delivers parts which are truly "fit for use".

## Some more complex solutions

### Working out a test regime.

In some assemblies a series of tests must be carried out to check all of the functions. With Furness Controls a test regime can be formulated to check for leakage, flow, blockage, movement, opening pressure or other parameters. Signals are given to actuate the assembly and the test results may be captured for analysis on a PC. Furness Controls work with such problems daily, providing solutions to both simple and complex test requirements.

### Integrated Solutions

Special instruments are built to customer order providing solutions to individual problems. Systems include floor standing test stations and integrated instrumentation packages each of them designed to meet the test requirement.



## Gas Appliance Testing

In addition to the FCO284 and FCO200 specialised leak and flow testing instruments for gas appliances, Furness Controls offers integrated solutions, including product recognition by bar code reader, which automatically sets the required parameters into the test instruments providing a secure test regime. Test results are transferred into a file that documents all the test results for that appliance, including electrical testing. By offering a fully flexible system that fits in with existing software packages, we are able to offer a package that meets your needs.



## Leak and function testing of pneumatic seat valves

Leading pneumatics company KV Automation carries out 100% testing on its range of miniature pneumatic valves designed to control the seat ride position on commercial vehicles. This complex miniature valve is crucial to the performance of the seat and KV's high reputation is ensured by the test regime worked out in conjunction with Furness Controls. The tests include leakage in different positions and blockage testing when ports are in the open position. In all each valve has 8 tests performed before it is accepted.



# Products



## FCO283

The FCO283 Leak Detector is a simple pressure decay instrument, particularly suited to the rapid testing of components, in extremely short cycle times from as little as 0.5 seconds. The FCO283 can easily interface with test fixtures and automation systems to provide a highly reliable test instrument, giving "Pass" and "Fail" signals for good and bad components. It is available for use with vacuum and pressures up to 30 bar. The FCO283 is the "entry level" Leak Detector built around performance at a reasonable cost



## FCO290

The FCO290 Leak Detector takes over where the FCO283 is unable to carry out all the tests needed. The FCO290 can make not only leak tests, but blockage or simple flow check tests as well as "ramp" tests required where the opening point of a valve or spring loaded device is needed, or even if the burst pressure of the part needs to be known. The FCO290 has the capability of carrying out a sequence of tests on a product at pressures from vacuum up to 30 bars including different pressures on the same part.



## FCO200

The FCO200 Flow Meter measures flow rate in litres/min for applications involved parts where the flow is critical such as fuel injectors. With built in pressure and temperature compensation the FCO200 outperforms conventional flow meters in production environments and has become the industry standard instrument in the Gas Appliance industry.



## FCO284

The FCO284 Leak Detector was designed specifically for the testing of Gas Appliances, meeting European Norms for Leakage rate in appliances and sub-assemblies. The instrument comes complete with pressure and ambient temperature compensation.





**Genius - advanced electrical safety test station**

The Genius from Clare Instruments is a powerful, yet flexible comprehensive electrical safety test station that combines 4 tests into one instrument. Neutral to Phase continuity, Earth Bond, Flash test (both ac and dc) and insulation Resistance are the standard safety tests incorporated, plus Live Load testing at 240/110V. Due to the unique design of Genius other functional testing options can be configured to provide a bespoke solution for the most demanding test specification.



**Gas Tracer System**

The Gas-Tech tracer gas system from Ion Science can be programmed to sense various gas types including Helium, Refrigerant Gases and LPG.

The Gas Tech compliments leak test systems where the point of leakage needs to be known.

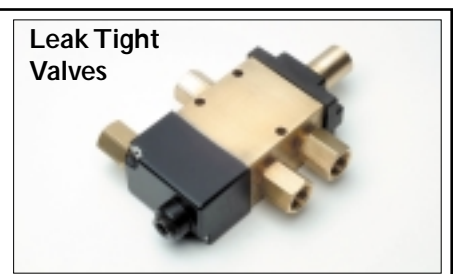


**FCO210 Micro-Calibrator**

Designed to adjust and measure leak rates in cc/min, the FCO210 is the preferred choice of Quality Control engineers concerned with the maintenance of Leak Detector performance. Available with certification to either national or UKAS standards, the FCO210 connects to the leak detector allowing adjustment of the instrument to the desired leak rate.

**FCO99 Calibrated Leak.**

Where a fixed leak device is required the FCO99 answers the need. Manufactured to a given leak rate and test pressure the FCO99 comes in a sealed clean box with calibration certificate.



# CMAX

## Data Collection and Control

Furness Controls have developed a Windows 9X and NT4 software programme entitled CMax to work with the FCO2XX Leak Detector product range. CMax outputs CSV (Comma Separated Variable) data that can be read into spreadsheets and databases for SPC purposes. Additionally CMax provides the protocol to give device control allowing test parameters to be uploaded to the test instruments according to the identity of the part or assembly. Parts can be recognized by Bar Code Reader or by entering the product ID via a keyboard or other device.



**CMAX Valve Shift**



**CMAX Product Select**

## Result Collection

| Date       | Time     | ID | Description | Bar Code | Serial No | Instrument                    | Seq | Test | Result     | Press | Unit | LR   |
|------------|----------|----|-------------|----------|-----------|-------------------------------|-----|------|------------|-------|------|------|
| 01-03-2000 | 13:52:20 | kp | FCO210 TEST | 12344    | 0.0001    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pass       | 2.41  | BAR  | 0    |
| 01-13-2000 | 14:04:34 | kp | FCO210 TEST | 12344    | 0.0002    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pass       | 2.41  | BAR  | 0    |
| 01-13-2000 | 14:05:08 | kp | FCO210 TEST | 12344    | 0.0003    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pass       | 2.41  | BAR  | 0    |
| 01-13-2000 | 14:05:50 | kp | FCO210 TEST | 12344    | 0.0004    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pass       | 2.41  | BAR  | 0    |
| 01-13-2000 | 14:06:34 | kp | FCO210 TEST | 12344    | 0.0005    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pos Fail 1 | 2.39  | BAR  | 55.1 |
| 01-13-2000 | 14:07:37 | kp | FCO210 TEST | 12344    | 0.0006    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pos Fail 1 | 2.4   | BAR  | 7.3  |
| 01-13-2000 | 14:08:24 | kp | FCO210 TEST | 12344    | 0.0007    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pos Fail 1 | 2.4   | BAR  | 7.3  |
| 01-13-2000 | 14:09:02 | kp | FCO210 TEST | 12344    | 0.0008    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pos Fail 1 | 2.4   | BAR  | 7.3  |
| 01-13-2000 | 14:09:46 | kp | FCO210 TEST | 12344    | 0.0009    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pass       | 2.41  | BAR  | 0    |
| 01-13-2000 | 14:10:24 | kp | FCO210 TEST | 12344    | 0.0010    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pass       | 2.4   | BAR  | 0    |
| 01-13-2000 | 14:11:49 | kp | FCO210 TEST | 12344    | 0.0011    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pass       | 2.4   | BAR  | 2.9  |
| 01-13-2000 | 14:12:29 | kp | FCO210 TEST | 12344    | 0.0012    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pos Fail 1 | 2.4   | BAR  | 3.2  |
| 01-13-2000 | 14:13:09 | kp | FCO210 TEST | 12344    | 0.0013    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pos Fail 1 | 2.4   | BAR  | 3.2  |
| 01-14-2000 | 08:15:22 | kp | FCO210 TEST | 12344    | 0.0015    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pass       | 2.49  | BAR  | 0    |
| 01-14-2000 | 08:16:08 | kp | FCO210 TEST | 12344    | 0.0016    | CELL 1/LOW PRESSURE TEST UNIT | 1   | 1    | Pass       | 2.5   | BAR  | 0    |

# Test Fixtures & Automation

Frequently a "turn-key" solution is needed where Furness Controls can supply the tooling and connectors required to seal the part thereby allowing the test to be carried out. We work with a number of companies advising on the best methods of sealing the part for leak detection.

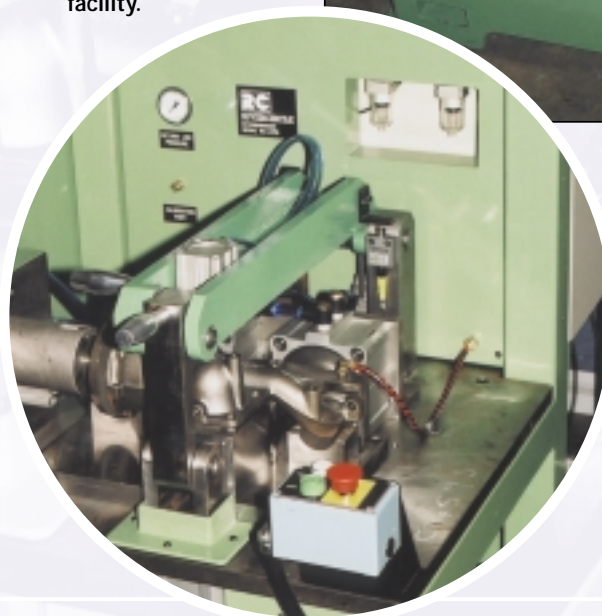
More complex test stands involving increased amounts of automation require the specialist help of organizations experienced in this field. Furness Controls work with a number of partner companies providing fixtures that meet customer needs. The advantages of working in partnerships of this kind lie in the co-operation of specialists from different fields bringing the best from each craft to the test requirement, ensuring a sure-fire solution.



**Manifold Dry Leak test Rig with heavy duty pneumatic sealing fixture**



**Compressor Body Twin Cavity Leak Test Rig with flood under-water inspection facility.**

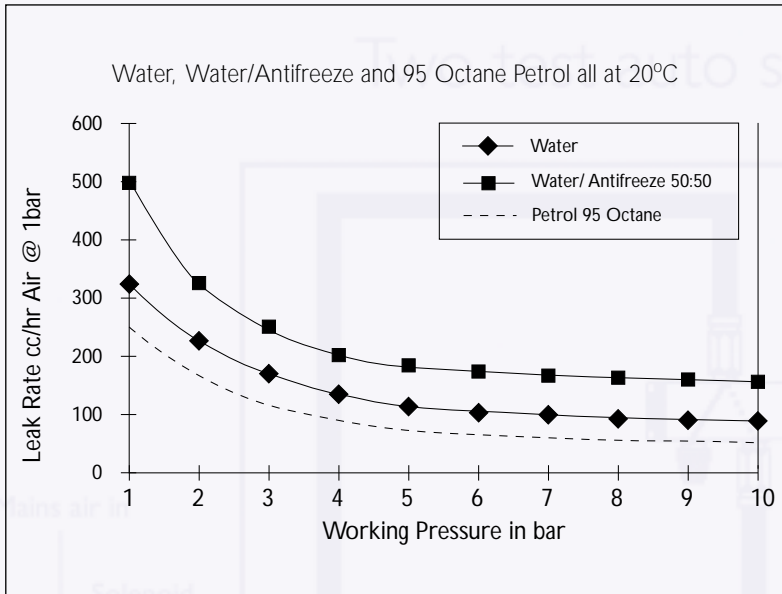


**Gas Regulator**



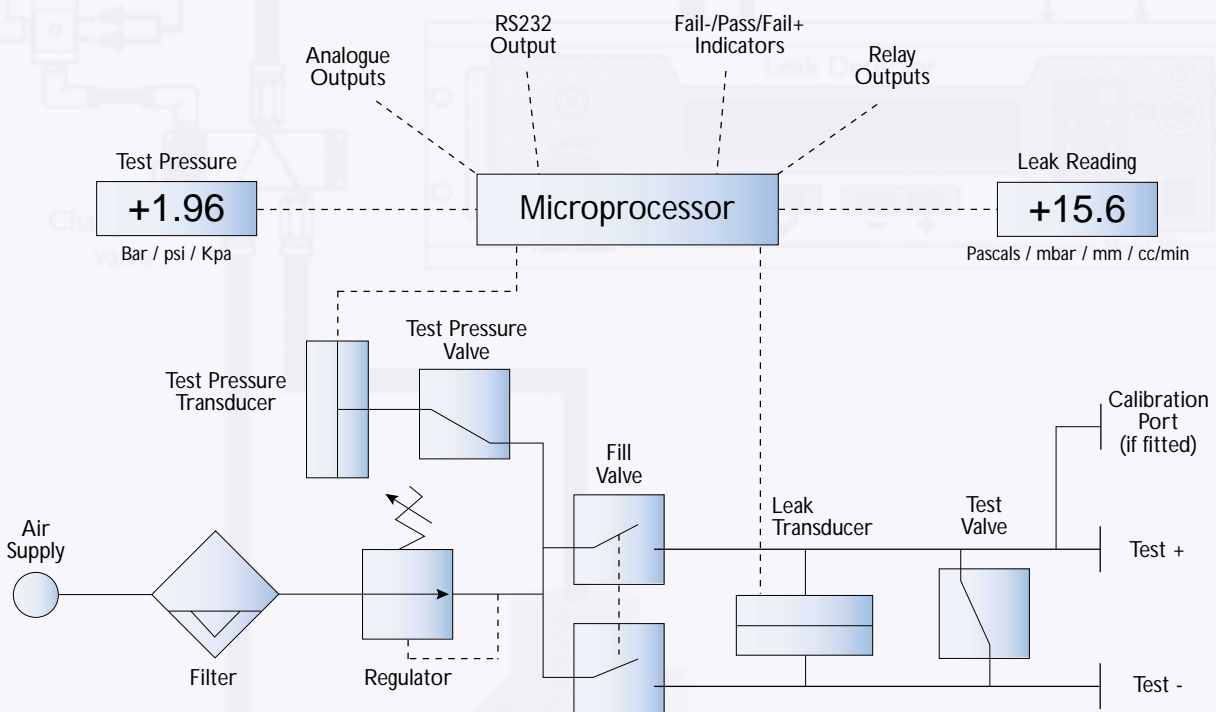
**Garden Spray Trigger**

# Leak Rates – the relationship between fluids



When measuring leak rates in parts it is usual to either set a value for pressure loss against time, or more commonly, a leakage value in cc/min. In either case Furness Controls can display the measured value and give a 'pass' or 'fail' indication. As with all manufacturing processes a specification for the part must be generated that is right for the duty the part has been designed and built for. It is therefore necessary to devise leak rates that are correct for the part to be tested. Traditionally "air under water" testing showed bubbles where leaks occurred. Often any bubbles were rejected as a failed part. Today with modern pressure decay leak detection systems it is normal to apply an air leak rate that does not leak the fluid for which the part is designed. There is a correlation between air leakage, water, oils, petrol, brake fluid and gases. These relationships are understood as these graphs show. Using them ensures that only good parts 'fit for purpose' are sent out, but also that parts previously scrapped can be accepted in some cases, saving money over traditional methods.

Leak Detector Block Diagram

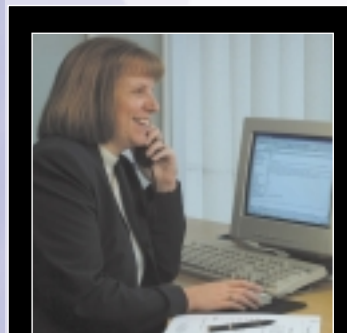


## "Fail-Safe" Operation

Furness Controls Leak Detectors are all built with safety features designed to ensure that no test can be completed which results in a bad component being "passed". Amongst the "fail-safe" features, is "valve sensing" which ensures that the internal leak tight valves are in the right position for the test to proceed. Most competitive systems do not include this critical check, resulting in invalid testing and faulty components reaching the customer.

# What about Support?

## Service is Central to our Success



### Repair & Calibration

Our main Service Centre is strategically placed in Tamworth Staffs, central to our customers in the United Kingdom and able to respond readily in support of our customers. Leak Detectors are Production Line Test Equipment, in use sometimes 24 hours a day and the need for quick service is paramount. Tamworth offers not only a repair and calibration facility, but a team of field service engineers, ensuring that production lines continue to run. Our staff at Tamworth work continuously to ensure that equipment is put back in service as quickly as possible.

### Customer Training Courses

Additionally Furness Controls runs customer-training courses to enable maintenance in the task of keeping production running.

### Product Evaluation Service

Other facilities at Tamworth include a product evaluation service, recommending the correct system to test a wide variety of products using our 30 years experience in leak test applications.

Our companies and agents worldwide, provide application support and after sales service using factory trained engineers to keep production lines moving. Furness Controls runs regular training programmes to familiarise company's maintenance staff with the needs of leak detection instruments. In many countries there are field service engineers able to maintain instruments on site, giving training and advice to operators and maintenance staff alike.

With Furness Controls you can be sure of the co-operation of our worldwide product support available in the following countries.

|           |                |         |           |          |              |                |
|-----------|----------------|---------|-----------|----------|--------------|----------------|
| Argentina | Canada         | Denmark | Holland   | Korea    | Spain        | United Kingdom |
| Austria   | Chile          | France  | Hong Kong | Mexico   | Sweden       | United States  |
| Australia | China          | Finland | India     | Norway   | Switzerland  |                |
| Belgium   | Columbia       | Germany | Italy     | Poland   | South Africa |                |
| Brazil    | Czech Republic | Greece  | Japan     | Portugal | Taiwan       |                |

# Maintenance

Production line test equipment needs maintaining in a fit condition, preventing failure in use and possible loss of production. Our service centres are fully equipped with the measuring and test instruments necessary to repair and calibrate our instruments, giving a rapid 24 hour turn-round when needed. In addition to our workshop engineers, our field engineers are available to repair and calibrate on site, minimising down time in production. Preventative maintenance can be carried out on a routine basis and customer training courses can be arranged to teach staff on how to use our instruments most effectively to keep them working. Please discuss your needs with our staff



## Maintenance Contracts

Leak test equipment needs maintaining in a fit condition, preventing wherever possible a loss of production. Our Maintenance Contracts are designed to provide a "call out service" and regular maintenance visits, which can include calibration and preventive work, ensuring the equipment's maximum availability.

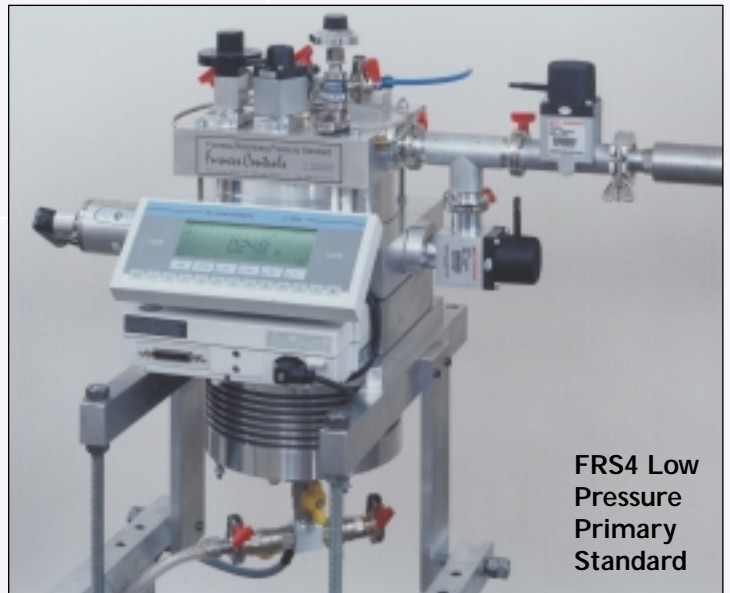
# Calibration and Tracability



With Furness Controls you can be sure of the full tracability of Calibration to National Standards. Through the unique and patented FRS4 Pressure Balance, Furness Controls has developed a standard for low pressure used by National Standards Bureaus throughout the world. The FRS4 is a primary standard developed by Furness Controls for the calibration of the low differential pressures experienced in leak detection work. As a result of building the FRS4 Pressure Balance Furness Controls has opened its own UKAS (United Kingdom Accreditation Service) Laboratory, accepted throughout the European Union.



Pressure Calibrator and Controller

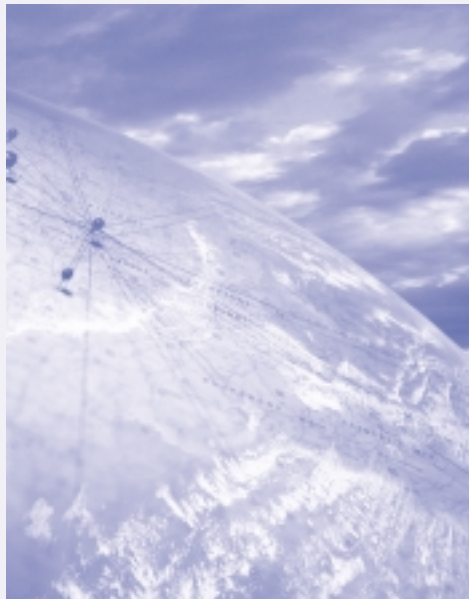


FRS4 Low Pressure Primary Standard

## You can be sure with our Calibration

A full instrument calibration service is available from Furness Controls for pressure and flow on all Leak Detectors - other makes too.

If a new certificate is needed to keep your leak detector in use then our service can help you. On site calibration is provided to keep your instrument hard at work. Want to send it to us for calibration? No problem, our Service Centres are available for this purpose.



## *Furness Controls*

---

### **Worldwide Headquarters**

FURNESS CONTROLS LIMITED  
Beeching Road, Bexhill  
East Sussex TN39 3LJ UK  
Tel: +44 1424 730316  
Fax: +44 1424 730317  
Email: [sales@furness-controls.com](mailto:sales@furness-controls.com)  
Website: <http://www.furness-controls.com>

### **Sales & Service Division**

FURNESS CONTROLS LIMITED  
4 The Pavilions, Amber Close  
Tamworth Staffordshire B77 4RP  
Tel: +44 1827 59950  
Fax: +44 1827 59540  
Email: [tamworth@furness-controls.com](mailto:tamworth@furness-controls.com)  
Website: <http://www.furness-controls.com>

