dr. wiesner®
prüftechnik

INTEGRA

The leakage test system for industrial leakage and flow tests

Know-how from more than 50 years of experience combined with up-to-date inspection technology

Basic functions

The intelligent leakage test system INTEGRA can be used for leakage testing, flow testing or functional testing with overpressure or vacuum. Assuming the form of a desktop unit, it is operated either manually, via external control signals or via an operation program of a connected PC.

The following scope of functions is the same for all various types.

- 255 test programs can be stored Several parallel running test processes possible
- Up to 3 test circuits can run in parallel and asynchronously
- Communication with PLC and control of devices and machines via field bus system, e.g. PROFIBUS or Interbus, or digital I/O for simple systems
- Complete integration into modern communication environments by interchangeable couple modules, safe for future development
- Parameter setting of test programs supported by system according to the autoTune method (patent pending, optional) or, alternatively, conventionally by setting process time periods
- Evaluation of pressure change measuring values using the differential method or, alternatively, conventional limit values
- Fully graphical color display featuring numeric and graphical indicators and clear test result displays with pictograms
- Language of text messages to display test steps and for operating instructions can be selected
- Password protection for various levels of admission
- Integrated statistics functions with graphical display
- Cyclic buffer for 4,000 measuring and test results
- Extensive testing functions and diagnosis features for troubleshooting
- Test Leak connection via rapid action coupling in front panel
- Integrated remote control and remote maintenance ability
- Permanent self test by monitoring the measuring sensor signals in each test cycle

Test methods

Differential-pressure method

In conducting the leakage test according to the differential-pressure method, the test specimen and a tight reference volume are filled with equal pressure. Afterwards they are both sealed off separately. After a stabilisation time has elapsed, during which temperature equalization takes place between the test specimen, testing equipment and test medium, the actual process of testing commences.
If the test specimen is leak, this will result in a difference in pressure between the specimen and the reference volume, this then being measured and subjected to rating which may be either absolute or differential.
Applying this method, use can be made of pressure sensors geared to maximum accuracy regardless of the test pressure selected. This method is highly suitable for detecting minor leakages.

Relative-pressure method

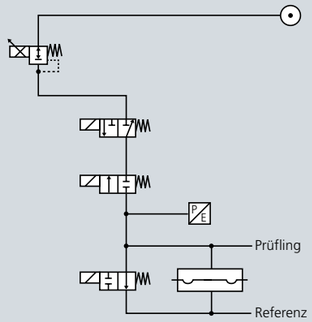
Applying this method, the test specimen is filled with a predetermined pressure. After the filling time has elapsed, the test volume is sealed off. Following a stabilisation time, during which temperature equalization takes place between the test specimen, testing equipment and test medium, actual testing commences.
If the test specimen is leak, the pressure in the test volume will begin to fall. The difference in pressure is measured between the beginning and end of the test period and is subjected to rating which may be either absolute or differential.

Applying this method, use is made of piezo-resistive pressure sensors, whose range of measurement corresponds to the test-pressure range. This method is highly suitable for detecting minor to medium-sized leakages.

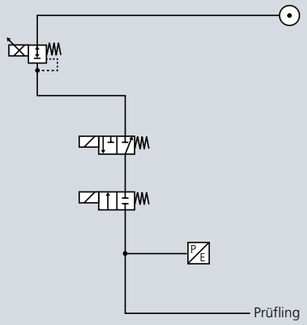
Flow method

For the flow method the test piece is filled via a bypass pipe with large diameter. At the end of the filling process, the bypass valve is closed. The air escaping from the test piece is led to a flow sensor. After an adjustable stabilisation period, the measured flow is evaluated. For measuring, either a mass flow sensor (mass flow measurement) or a Laminar-Flow-Element with a differential pressure transmitter (volume flow) is used. For the mass flow measurement, the temperature difference of the airflow between input and output of a heated measuring channel is measured. With volume flow measurement, the difference in pressure in a laminar flow serves as measuring value for the flow. This method is especially suited for testing pieces with a large volume and large admissible leakage rates such as ventilation pipes or exhaust systems.

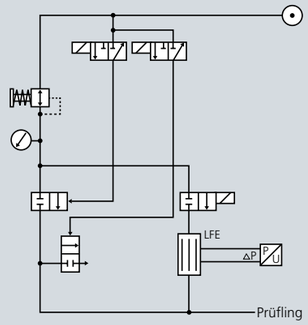
Functional diagram Differential-pressure method



Functional diagram Relative-pressure method



Functional diagram Flow method (volume flow)



Special devices

The leakage test system INTEGRA is a multi-functional test device that can be used to configure customer-specific special applications. This image shows an example. This is a flow test device for especially large test volumes such as exhaust systems or ventilation pipes. The entire test pneumatic system is housed in a separate casing. Thus it is possible to insert application-specific components without having to forego the familiar functionality of INTEGRA. Because of the intelligent, freely configurable operation software, a wide range of various tests and test processes can be realized. Thus, tests for mechanical, electrical or other physical values are possible.

Multi-circuit ability

If several test pieces are to be tested simultaneously, several test circuits simultaneously in one test piece, or several tests within one facility independently of each other, INTEGRA multi circuit systems are called for.
To each INTEGRA basic device up to two additional test circuits can be connected with the help of optionally available multi-circuit extensions; thus, three different tests can be carried out for each basic device.
All test circuits work entirely independent of each other. They can use different or the same set of parameters, they can be started simultaneously or subsequently, and each test circuit can operate according to a different test method. Test circuits for customer-specific special applications for additional tests such as functionality tests can be realized.

Application examples:
By testing three test circuits simultaneously on one test piece with different test pressures, it is possible to recognize leakage to the outside as well as leakage between the individual test rooms in the span of one test run. With low cycle times within an automatic facility, several parallel running tests of the same kind but with separate evaluations are often appropriate. If, for example, various characteristics are to be tested within one automatic assembly line in several places, a multi-circuit INTEGRA with test circuits for various test methods can be applied. The timing for starting each test and its evaluation can be synchronized to the requirements of the test station. Exchange of signals and data evaluation are concentrated in one central position.

Freely programmable device control

In order to test components for leakage, it is usually necessary (in addition to the leakage testing system) to have a stressing and sealing device, by means of which the space due to undergo testing is separated from the atmosphere. To obtain reproducible processes and to ensure proper monitoring of „reject part" handling, these devices are nor-mally controlled on automatic principles.

Therefore a leakage test station normally is equipped with a PLC control system.
As – apart from the stressing and sealing devices – the interface linked up to the test unit needs to be operated and several operating controls are necessary, such a control system normally results in substantial financial outlay.

This extra cost are now not necessary anymore!

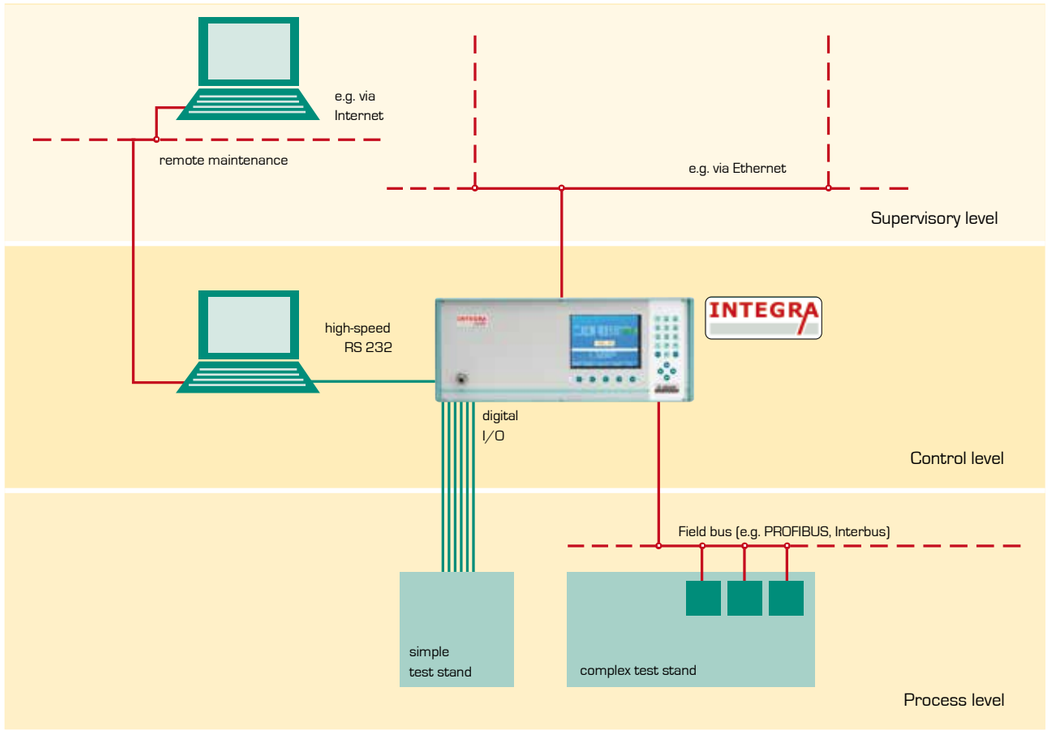
All leakage test systems in the INTEGRA series – even on the basic version – are provided with digital in- and outputs capable of being used for device control. Controlling extensive test stands combined with complex processes is reachable with optional available bus coupling modules (Profibus, Interbus,...) and with the freely programmability of additional operations. Thereby several operations are running capable parallel to the test process.

Automatic test process optimization *autoTune*

Process parameters that are set wrongly or in a non-optimal fashion are the most frequent cause for measurement errors in leakage tests. Test process duration that was set too long causes unnecessary machine run times and thus considerable cost. Too short process times often lead to false rejections or faulty tests. A truly optimal setting of parameters has so far been a matter of great experience or extensive measurement series.
This problem is solved automatically by the intelligent leakage test system INTEGRA with its optionally available autoTune method. Using a sample test piece, INTEGRA determines automatically the optimal process parameters after a few characteristics have been entered which can be taken from a drawing. The necessary reproducibility is accomplished with the shortest possible process time. When using a Test Leak, the process capability of the automatically determined parameters is automatically proven. For this process, mathematical methods are used that were defined in our patent-protected differential method.
Advantages of the automatic test process optimization autoTune:

- Process reliability
- Low machine cost
- Reduction of false rejections
- Less effort for putting into operation

Communication environment



The leakage test system INTEGRA can be integrated completely into modern communication environments and is ready for the future. Data exchange and control functions can be realized via e.g. Ethernet on the supervisory level, via PROFIBUS or Interbus on the automation level, via serial interface or via 16 digital I/Os. It is optimally prepared for future applications due to the use of interchangeable coupling modules. Furthermore, the possibility of remote maintenance or remote control via Internet is the fastest and easiest way to offer help on the spot, carry out trouble-shooting or upload software updates.

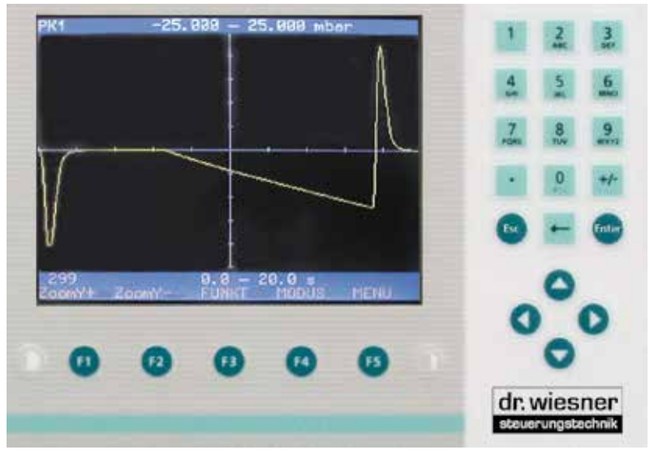
Graphical display

The installed LCD graphic display serves to indicate the time curve of the measured values, the individual sequence steps of the test being separated by vertical lines as a mean of improving overall clarity.
The zoom function facilitates freely adjustable setting of the display range, thus enabling partial test areas of interest to the viewer to be analysed applying increased resolution.

The display of the relative-pressure and the differential-pressure could be changed. This caters for good functional clarity, even when measuring fine pressure changes under high test pressure.

The measured values of the last test run in each case are put into memory storage on the unit, thus facilitating subsequent detailed viewing.

The graphical display has a 320 x 240 pixel resolution. The brightness control feature mounted to the front panel provides optimum setting facilities for all viewing angles.



■ Test leaks

Test leaks are used for simulating leakages when setting or monitoring leakage test equipment. They are incorporated in the test line instead of a test specimen or parallel to a leakproof specimen. A capillary glass tube specially adapted to the desired leakage rate, presets a defined flow resistance. The capillary tube is installed in a metal housing and protected against contamination by a filter system. Our test leaks are distinguished in particular by simple handling and long service life.

Options/Accessories

- **Factory certificate**
  confirming compliance with back-traced measuring devices
- **Automatic process optimization *autoTune***
- **Multi-circuit extension of the basic device**
  for connecting additional test circuits incl. coupling module for PROFIBUS connection
- **Additional test circuit**
  without own pressure control, in casing 1/2 19"/3HE, 380mm deep
- **Manual pressure control**
  for additional test circuit
- **Overflow safety**
  for devices operating according to mass flow method to avoid lag time after gross leaks
- **Special test pressure range (vacuum + excess pressure)**
  Test pressure ranges
  – 1 … 1; -1 ... 3; -1 ... 5 or -1 ...9 bar
- **Second test piece connection**
  switchable using program selection
- **Filling using pre-volume**
  to recognize gross leakage when testing hermetically sealed components; pre-volume up to 50cm3
- **Test Leak connection switchable**
  automatically using program selection
- **Bus coupling module for PROFIBUS connection**
  realized as PROFIBUS slave
- **Bus coupling module for PROFIBUS connection**
  realized as PROFIBUS master
- **Bus coupling module for Ethernet connection**
  Realized as TCP/IP, IT functions, Modbus TCP
- **19" installation kit**
  for installing all 19" casings in 19" system racks

Technical data	
All INTEGRA basic devices have standard equipment as follows:	
• electrical supply:	85 ... 264 V, 50 ... 60 Hz
• pressure regulation:	electronically (except for *DF1*)
• number of programs storable:	255
• colour display:	fully graphical
resolution:	320 x 240 pixel
• adjustable times: pre-filling, filling, stabilisation test, emptying	 0.1 ... 9999.9 sec in each case
• Test Leak connection:	via rapid action coupling in front panel
• interfaces:	1 x digital I/O (16 IN, 16 OUT) 3 x serial RS232 2 x slots for individual bus coupling modules
• desktop housing protection class: dimensions: weight	 IP40 19"/4U high; 450x185x380mm (WxHxD) approx. 15.5kg

Devices for relative-pressure method	
INTEGRA *RD1*	
pressure- and measuring range:	0 ... 1 bar
resolution:	2.5 Pa
INTEGRA *RD4*	
pressure- and measuring range:	0 ... 4 bar
resolution:	10 Pa
INTEGRA *RD6*	
pressure- and measuring range:	0 ... 6 bar
resolution:	15 Pa
INTEGRA *RD10*	
pressure- and measuring range:	0 ... 10 bar
resolution:	25 Pa
INTEGRA *RDV*	
pressure- and measuring range:	-1 ... 0 bar
resolution:	2.5 Pa

Devices for differential-pressure method	
measuring range:	±20 mbar
resolution:	0.1 Pa
INTEGRA *DD1*	
pressure range:	0 ... 1 bar
INTEGRA *DD6*	
pressure range:	0 ... 6 bar
INTEGRA *DD10*	
pressure range:	0 ... 10 bar
INTEGRA *DDV*	
pressure range:	-1 ... 0 bar

Devices for mass flow method	
pressure ranges:	0 ... 1 bar
	0 ... 6 bar
	or 0 ... 10 bar
accuracy:	±1% of max.
INTEGRA *DF1M*	
measuring range:	0.1 ... 10 ml/min
INTEGRA *DF2M*	
measuring range:	2 ... 200 ml/min

Devices for volume flow method	
INTEGRA *DF1* with additional desktop housing IP40; 19"/3U high, 380 mm deep	
pressure range manually adjustable:	0 ... 1 bar
measuring ranges:	0.3 ... 3 l/min
	1.5 ... 15 l/min
	5 ... 50 l/min
	or 12.5 ... 125 l/min
accuracy:	±5% of max.

INTEGRA

Complete solutions

To assure the quality of your products, very often not only a particular characteristic has to be tested. No matter if serial test devices, single-purpose test units or multiple function test stands are required, we could offer firsthand complete solutions for different branches of industry.

- Leakage tests
- flow tests
- functional tests and
- other fluidal, mechanical, electrical or optical tests

can be combined arbitrarily. On demand also with adjustment and mounting functions.

dr. wiesner®
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Leak test | Flow test | Functional test | Testing protective equipment

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