CETA® Newsletter

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Dear readers,

Right on time for the MOTEK 2005 exhibition, here is our CETA newsletter no. 3, in which you will find once again diverse reports from our company. In this context, we would like to draw your attention to our newly designed leak detector with mass flow sensor, CETATEST 610, which will be introduced to the public at the MOTEK.

Wishing you a pleasant reading,

Yours sincerely

Günter Groß
Managing Director

P.S:

Take advantage of the exhibition and visit us in hall 3, stand 3405. We are looking forward to meeting you.

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CETATEST 610
Leak detector with mass flow sensor

NEW

Our delivery program of leak detectors and flow testers has been extended with our CETATEST 610, a leak detector with mass flow sensor, which has been available since the last quarter of 2005. Typical tasks of the leak-testing technology are water and oil leak tightness tests as well as tests according to the requirements of the IP protection categories.

Besides testing of small components, the automotive industry increasingly requires testing of large-volume systems (e.g. engine blocks, gear boxes, fluid reservoirs, coolers, batteries, mufflers, head lights). Leak-testing of these products is characterized by large volumes (up to a few litres) and at the same time a low permissible leak rate (down to 0,01 mbar•l/s corresponding to 0,6 ml/min). This is an ideal range of application for a mass flow tester.

The measuring principle of the mass flow tester CETATEST 610 is based on calorimetric measurement of the leakage-related mass flow. The testing medium is compressed air. Temperature influences are taken into account, and the mass flow is directly indicated in standard cc/min (sccm). CETATEST 610 is supplied with 2 test pressure ranges (1 bar, 9 bar) and with electronic or mechanical pressure regulator. The test and stabilization pressures are monitored by a fast A/D converter, which takes 50 measurements per second. The mass flow sensor allows measurement of mass flows up to 10 sccm, typical of leak tests, with a minimum resolution of up to 0,01 sccm (depending on the mass flow area). Other measuring ranges are available on demand. The test modes „dynamic pressure“ and „closed component“ are available as option.

The mass flow test device CETATEST 610 efficiently rounds up the delivery program (leak detectors with differential pressure sensor (CETATEST 510 and 810 series) or overpressure sensor (CETATEST 710 series) and flow testers (CETA 900 series)). The CETATEST 610 is equipped with the established, user-friendly menu navigation including online-help for each menu item. With a test leak connected to the front of the test device, it is possible to check within seconds the correct setting of the device or of the whole testing system including adapter fixture.

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CETATEST 710 and 810 now with mechanical pressure regulator

NEW

The successful leak detector series CETATEST 710 (with overpressure sensor) and CETATEST 810 (with differential pressure sensor) are now available with mechanical pressure regulator. This economic version is particularly suitable for applications where the test parts in the production line are leak-tested at only one defined test pressure.

30 bar leak detector

New motor technologies often call for leak tests at much higher pressures. A test device based on the CETATEST 810 platform is currently in the engineering phase, and will be designed for a test pressure up to 30 bar. According to the current development status, this test device will be available at the end of 2005. With this device, the maximum test range of 16 bar of the CETATEST 810 series will be considerably increased.

Temperature compensation

Temperature variations produce changes in the pressure of the compressed air enclosed in the test part. These variations are detrimental to measurement results, particularly during the test phase of a leak test. The pressure loss due to a leakage could then be covered by an increase of pressure due to a temperature rise of the enclosed air. The higher the test pressure, the greater the thermal related pressure variation. The compensation method engineered by CETA allows process-reliable leak test of warm test parts. During a pre-measuring phase, the temperature behaviour of the test part, the adapter fixture and the pneumatic lines is determined and recorded. This information is used during the measuring phase to correct the measured values. The procedure works independently of test pressure and test part volume. External sensors are not necessary. Therefore the trouble for integration of the sensors to the adaption and their data recording can be spared. Besides, there are no additional recurring costs for recalibration of the sensors. The additional function "temperature compensation" is available for the CETATEST 810 series.

CETA practical tip:

Influence of height on air pressure Barometric height formula

In case of leak tests using negative overpressure, vacuum pumps are normally used for producing negative overpressure. At sea level, it is usually unproblematic to reach the desired negative overpressure in the test part. However, the situation is quite different if the production line and test stand are located in altitude. With the decrease of air pressure due to height, it can happen that the evacuation of the test part to reach the target pressure is not possible any more. The height-dependant decrease of air pressure is quantified by the so-called „barometric height formula".

For heights up to approx. 100 km, we have:

$$p(h) = p_0 \bullet \exp\left(-\frac{h\,[m]}{7.990\ m}\right)$$

with

p_0 = 101.325 Pa (air pressure at sea level at 0°C)

h = altitude in m

Height	$x \bullet p_0$	$p_{absolut}$	$\Delta(p_{absolut} - p_0)$
0 m	1,00000	101.325 Pa	0 Pa
8 m	0,99900	101.224 Pa	- 101 Pa
100 m	0,98756	100.065 Pa	- 1.260 Pa
500 m	0,93934	95.179 Pa	- 6.146 Pa
750 m	0,91040	92.247 Pa	- 9.078 Pa
1000 m	0,88236	89.405 Pa	- 11.920 Pa
2500 m	0,73133	74.102 Pa	- 27.223 Pa
5000 m	0,53484	54.193 Pa	- 47.132 Pa
8000 m	0,36742	37.229 Pa	- 64.096 Pa

In the vicinity of the earth surface, we have approximately: For each 8 m gained or lost in altitude, the air pressure decreases or increases by 100 Pa, equivalent to 1 mbar.

Conclusion: In case of leak tests with negative overpressure, the appropriate height-dependant air pressure must be taken into account when choosing the parameters of the test.

Complementary remark: For very accurate calculation of air pressure, please observe that the air temperature decreases with the altitude. This relationship is also quantifiable.

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