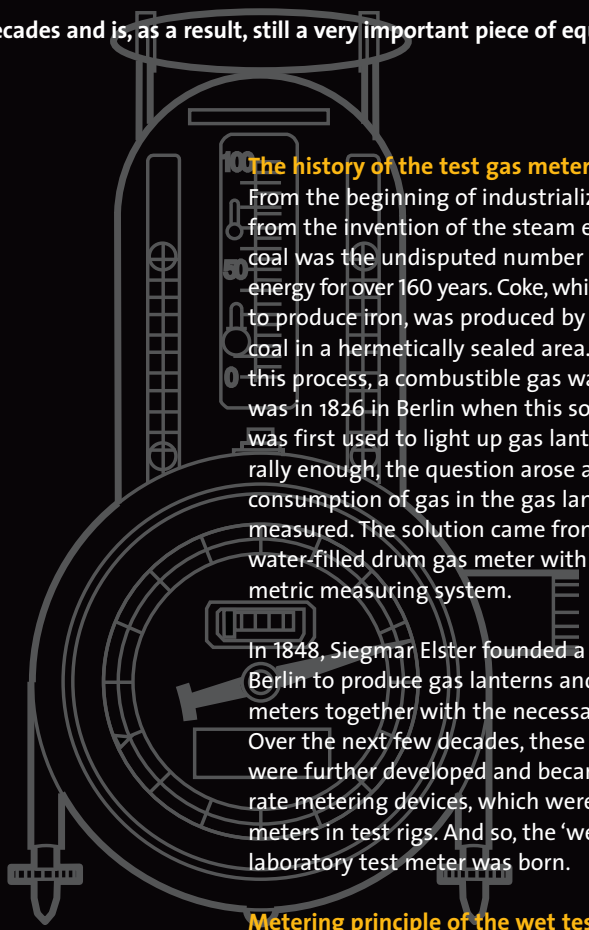
HIGH PRECISION GAS MEASUREMENT FOR LABORATORIES:

What about an experiment?

More than 180 years ago, a metering device was invented which is still used today in laboratories and development centres throughout the world. The laboratory test gas meter has undergone constant development over the decades and is, as a result, still a very important piece of equipment.



The history of the test gas meter

From the beginning of industrialization, or rather from the invention of the steam engine in 1782, coal was the undisputed number one source of energy for over 160 years. Coke, which was necessary to produce iron, was produced by heating natural coal in a hermetically sealed area. In the course of this process, a combustible gas was generated. It was in 1826 in Berlin when this so-called coal gas was first used to light up gas lanterns. Then, naturally enough, the question arose as to how the consumption of gas in the gas lanterns could be measured. The solution came from England: a water-filled drum gas meter with a purely volumetric measuring system.

In 1848, Siegmar Elster founded a company in Berlin to produce gas lanterns and 'wet' gas meters together with the necessary accessories. Over the next few decades, these wet gas meters were further developed and became highly accurate metering devices, which were used as master meters in test rigs. And so, the 'wet version' of the laboratory test meter was born.

Metering principle of the wet test gas meter

Drum meters are displacement meters with a rotating metering gear, which is used to measure the exact volume of gas.

The most important features of the device include the housing, the measuring drum, which is divided into five measuring chambers, and the display on the counter. Mostly water or a thin mineral oil is used as a sealing liquid. The level of sealing liquid is set and maintained by means of a level indicator in the meter housing. Each time the drum revolves, a constant volume of gas flows through the meter. During the revolution, the measuring chambers are filled with the gas until they are completely submerged in the sealing liquid. When this happens, they are cut off from the gas inlet pipe. As the drum continues to rotate, the outlet is opened up and the gas is released from the meter via this outlet. If you multiply the number of measuring chambers by the number of revolutions of the drum axis, you get the measured volume, which is then displayed on the counter.

These gas meters are produced in various versions to cover a range of volumes from 2 l/h up to 15.000 l/h.

The meters operate with a maximum inlet pressure of 10 or 50 mbar. On request, it is possible to deliver high-pressure versions. The choice of material ranges from brass to PVC to meters made entirely of stainless steel. If required, the meter can be fitted with a Namur or rotational pulser. With the help of this interface, it is possible to reduce the volume to a range of 1 ml / impulse. This means that even the smallest of volumes can

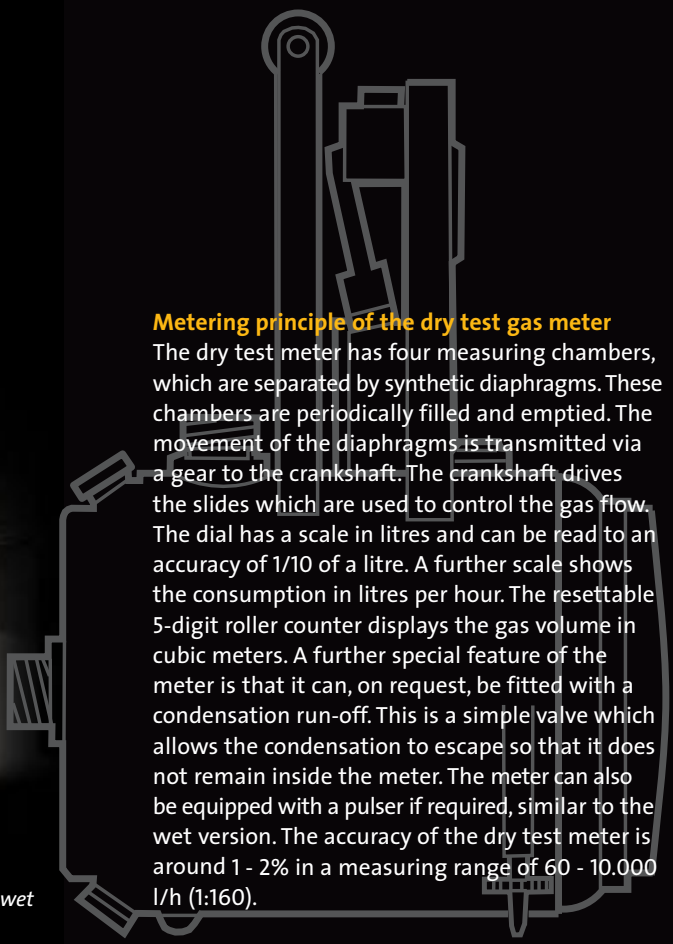
Laboratory gas meter, dry version (left) and wet version (right)

be registered. The counter has been reengineered in such a way that the drag pointer can be reset to zero. This makes it possible to start the measuring process exactly at zero on the scale.

The accuracy of the wet test meters is lower than 1% in a measuring range of 1:100. They are also suitable for analysing the smallest of by-pass flows and, on account of their flexibility and robustness, are indispensable in many environmental, chemical and pharmaceutical laboratories.

Dry test meters

The dry version of the test gas meter, just like its 'wet brother', is used in laboratories and industry. Its easy-to-handle design and high operational safety mean it can be used universally in moblie laboratories and in many chemical and physical fields of application. In engine test rigs they are used, among other things, for 'blow by' measurements (crankshaft ventilation in the engine) and for the analysis of exhaust fumes.



Metering principle of the dry test gas meter

The dry test meter has four measuring chambers, which are separated by synthetic diaphragms. These chambers are periodically filled and emptied. The movement of the diaphragms is transmitted via a gear to the crankshaft. The crankshaft drives the slides which are used to control the gas flow. The dial has a scale in litres and can be read to an accuracy of 1/10 of a litre. A further scale shows the consumption in litres per hour. The resettable 5-digit roller counter displays the gas volume in cubic meters. A further special feature of the meter is that it can, on request, be fitted with a condensation run-off. This is a simple valve which allows the condensation to escape so that it does not remain inside the meter. The meter can also be equipped with a pulser if required, similar to the wet version. The accuracy of the dry test meter is around 1 - 2% in a measuring range of 60 - 10.000 l/h (1:160).

Both versions of the test meter can be specially calibrated to meet the requirements of the individual field of application.

As a result of the continuous development over the years and by reacting to customer suggestions concerning the design and functionality, the laboratory test gas meters have acquired their own individual character.

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