

**GAS-LAB Q1**

*Gas quality measuring device with PTB approval*

In a previous issue of Profiles we introduced a new type of technology for measuring gas quality which is based on light absorption in the infrared spectral range. The first product to incorporate this new technology was also presented in a further issue. In the meantime, the device has been successfully employed in a number of different projects and has received its approval from the PTB.

Against the backdrop of the liberalisation of the gas market, it has to be assumed that the number of trading partners and the trading volume of gas will rise. In this case, it is highly likely that the gas quality will fluctuate more often and to a greater degree than it has done so far. As a result, there will be an increasing demand for systems that measure the calorific value and other gas quality characteristics (standard density, CO<sub>2</sub> concentration, Wobbe index, methane count, etc.). An exact determination of the gas quality is in many applications of the utmost importance, both from a technical and economic point of view.

The gas quality metering device gas-lab Q1 continuously determines the most important gas characteristics without the need for combustion and is suitable for a variety of applications such

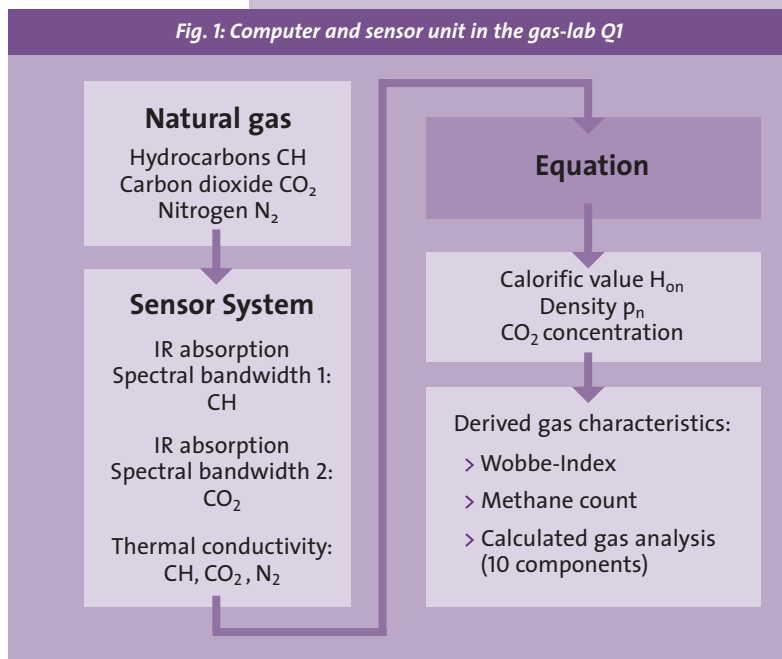


Fig. 2: Computer and measurement device

as control/regulation, in-house metering or backup metering. Having recently received PTB approval, as mentioned above, the gas-lab Q1 can now also be used for official billing purposes.

When compared to conventional methods based on calorimeters or gas chromatographs, the gas-lab Q1 enables the user to make considerable cost savings with respect to both capital expenditure and running costs.

Fig. 1: Computer and sensor unit in the gas-lab Q1



**The function of the process**

The metering principle was described in detail in Profiles, 2002, Vol. 1, and has also been presented in various technical journals, so this article will only give a brief outline. The gas-lab Q1 works with two infrared sensors and a sensor for thermal conductivity. Light is fed through the gas and the infrared sensors measure the light absorption of the hydrocarbons and the carbon dioxide contained in the natural gas. In addition, a further sensor determines the thermal conductivity of the gas and registers other components which do not absorb infrared light, e.g. hydrogen. The three measured values are then entered into a mathematical equation which results in the calorific value, the standard density and the CO<sub>2</sub> content (Fig. 1). These values are required if a volume corrector is to calculate the compressibility factor and the standard volume of gas. An energy flow computer can calculate the energy content of the gas.

**gas-lab Q1 – structure and data**

The gas-lab Q1 consists of two components: the sensor unit and the evaluation computer (Fig. 2). The sensor unit contains the sensor block, the electronic control system and the signal processing system as well as a 3-channel valve block to select the gas. It is housed in a robust aluminium housing, which is approved for use in hazardous areas. This means that the Q1 sensor unit can be installed immediately next to the area where the gas sample is to be taken. The Q1 computer is connected to the sensor unit via a serial data communication link and can be set up at a distance of several hundred meters. This controls the metering process, calculates the important values and carries out all further communication necessary. The Q1 sensor unit is assembled on a modular platform which comes together with two low-pressure regulators to regulate the operating and calibration gases (Fig. 3).

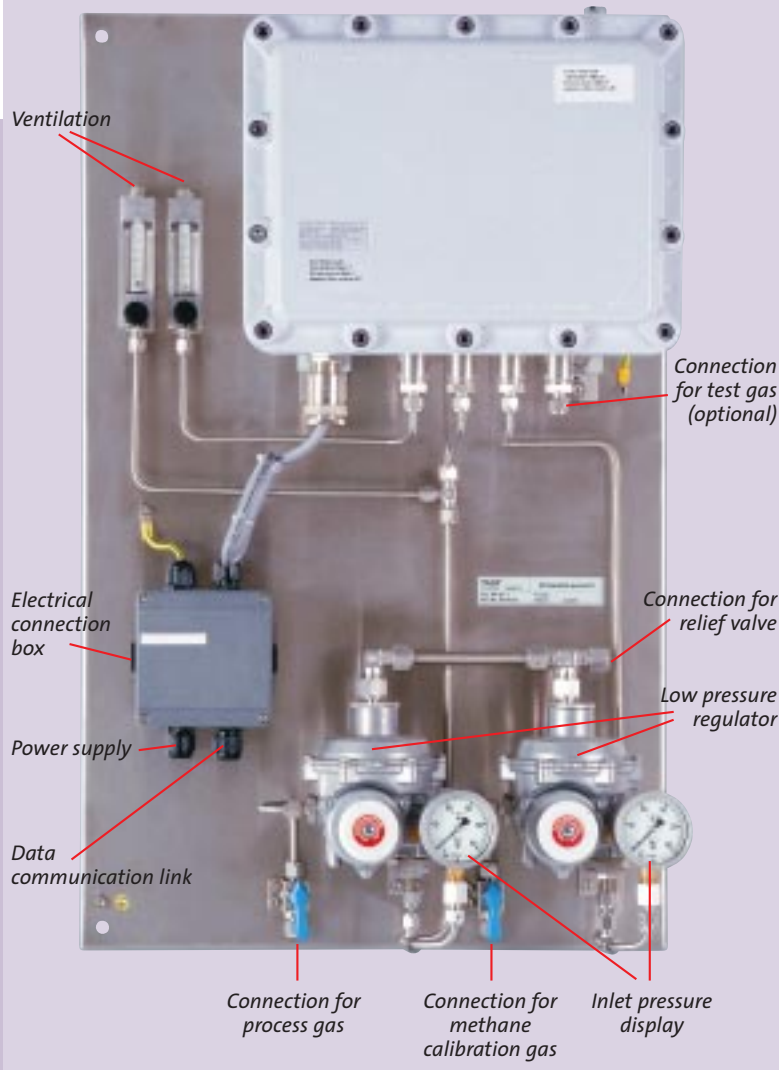
The gas-lab Q1 is suitable for any natural gases (not including conditioning gases) and is used to determine calorific value, standard density and the concentration of carbon dioxide. The measurement is carried out continuously, approximately every 1 second. The gas-lab Q1 is automatically calibrated every week using methane, whereby a 10-litre bottle is sufficient to last for the entire official calibration period. The gas is supplied via low-pressure regulators with an inlet pressure of 200 mbar up to 4 bar and a gas consumption of 30 l/h. The reaction time of the measurement when the gas changes depends on the gas throughput when the sample is taken and is approximately 40 seconds (T90 time). By using a bypass, the reaction time can be accelerated to around 15 seconds. The sensor unit contains a third gas channel, which can be used, for example, for test purposes.

The evaluation computer is based on FLOW COMP's gas-net family of devices such as the Z0, Z1 and F1 flow computers. It has typical features such as DSfG, integrated registration as well as analogue and digital outputs. The characteristics of the gas quality are recorded in an integrated archive. The built in remote data transfer unit enables the data to be called up remotely via telephone and modem.

**Applications**

The gas-lab Q1 is already in use in a wide variety of applications. In the field of gas transport, it is used in mixing and regulation systems, in gas storage control systems as well as back-up systems for official gas chromatographs in larger stations. When it comes to gas distribution, the gas-lab Q1 is used to measure energy or to replace the density volume correction by state volume correction. On account of its continuous and online-metering of all important gas parameters, the gas-lab Q1 is also used in many industrial

Fig 3: Assembly platform showing sensor unit and low-pressure regulators



applications, e.g. in gas-fired power plants either for billing purposes, to monitor the degree of efficiency or to control the turbine.

The gas-lab Q1 with a PTB approval is the ideal solution for official energy metering in smaller and medium-sized gas distribution stations where, until now, it has simply been too costly to carry out an independent measurement of the characteristics of the gas.

Would you like to measure your energy by yourself? Why not talk to Wolfgang Mursch? He'll be delighted to help you. Tel.: +49 (231) 93 71 10 - 20 [mursch@flowcomp.de](mailto:mursch@flowcomp.de)

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