dreizler® oxygen and oxygen plus - Efficiency optimisation by the control of oxygen- and CO

Description O_2-regulation oxygen

According to the Siegert formula, the combustion efficiency, or in other words the degree of conversion from chemically bound energy into thermal energy can be calculated as follows:

$$h_F = 1-q_A = 1-((t_A-t_L)*(A_2/21-O_2)+B)$$

where q_A is the flue gas loss which occurs because hot waste gas escapes unused through the chimney.

This formula tells us that the objective must be to reduce the temperature of the flue gas as far as possible (for example by flue gas heat exchangers and optimised and operating conditions for the boiler) while keeping the volume of the flue as low as possible. In that situation, the loss in flue gases will be a minimum.

As far as the volume of flue gas is concerned physics sets a limit because each fuel requires a minimum amount of combustion air to fully convert the energy content. In this situation one talks of stoichiometric combustion or **Lambda λ = 1**.

The better the properties of a burner match the selected fuel and the conditions of use the more closely the burner approaches the stoichiometric limit. In this regard it is important that no unconsumed waste-gas constituents such as e.g. CO (carbon monoxide), VOC (unburned hydrocarbon material) or soot are released.

In practice a burner is subject to a number of local impacts which influence the combustion and the ratio of the supplied combustion air and the energy content of the amount of fuel available.

The factors which have the greatest influence are:

- In the case of natural gas fuel:
  - Variations in the calorific value of the fuel
  - Quantity changes resulting from variations in gas pressure
- In the case of the combustion air:
  - Variations in the temperature of the combustion air
  - Variations in air pressure
- Plant-dictated variations of combustions circumstances
  - Chimney draft
  - Pollution of fan wheels etc.

Even relatively small variations of these parameters mean that the air ratio number Lambda **l** changes. dreizler® **oxygen** burners with oxygen control measure the oxygen content in the waste gas and optimise the amount of air. In this way the burner always operate at minimal levels of Lambda **l** and, consequently, minimal volume of waste gas and maximum combustion efficiency. This type of oxygen optimisation can be applied to almost all liquid and gaseous

fuels and saves the operator between 2 and 5% of his fuel costs per annum. Depending upon the size of the plant the investment in this equipment is amortised within a few months.

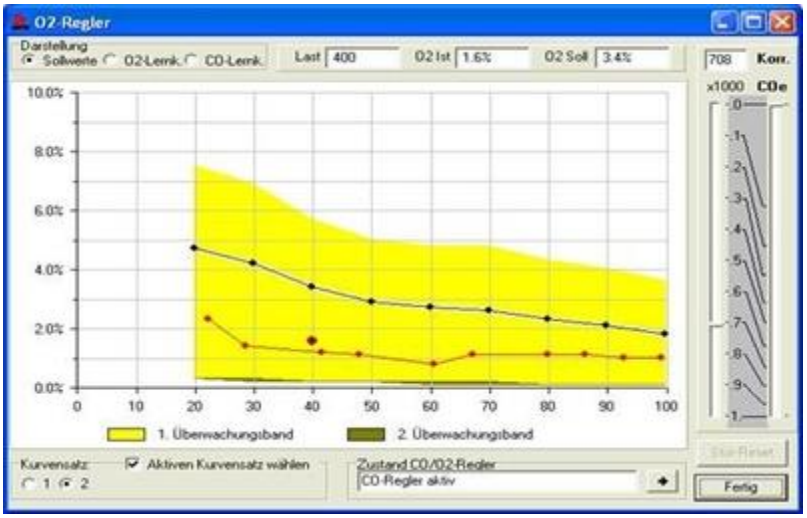
Example

marathon gas and combi burner with oxygen

The combined regulation of O_2- and CO oxygen plus for gas burner

dreizler® has now introduced a further innovation for gaseous fuels: the combined regulation of O_2 and CO.
In comparison with O_2-regulation the difference is that in additon to determining the concentration of O_2 a further flue gas sensor measures the concentration of unburned waste gas constituents. The combination of O_2 and CO-concentrations means that it is possible to more closely approach the stochiometric ideal and thereby reduce the quantity of waste gas yet again. In spite of this, however, there is the assurance that the proportion of unburned and poisonous waste gas constituents such as, for example, CO (carbon monoxide) will not exceed a settable concentration limit.

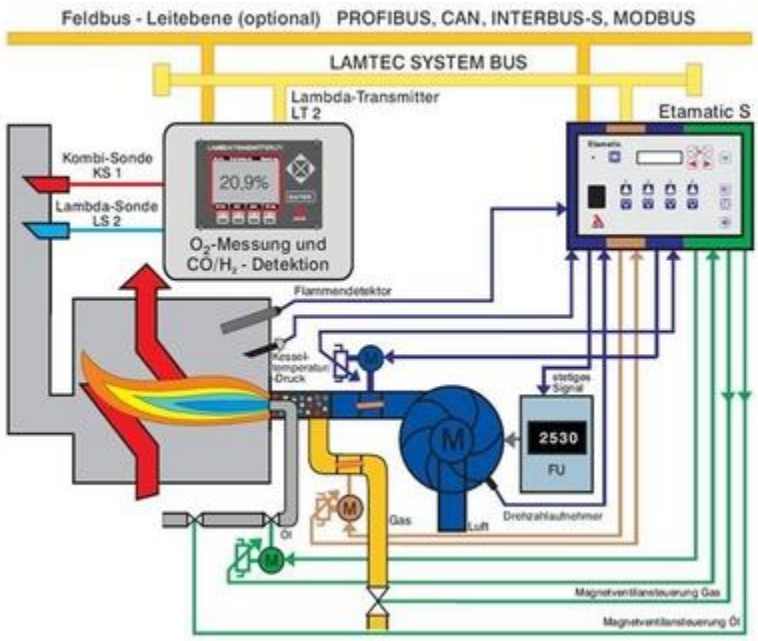
The result:
In comparison with oxygen regulation alone a further 0,5 - 1,0% saving in fuel consumption can be achieved by the still further economical combustion conditions.



The following schematic describes how the O_2 and CO regulation dreizler® oxygen plus system is installed

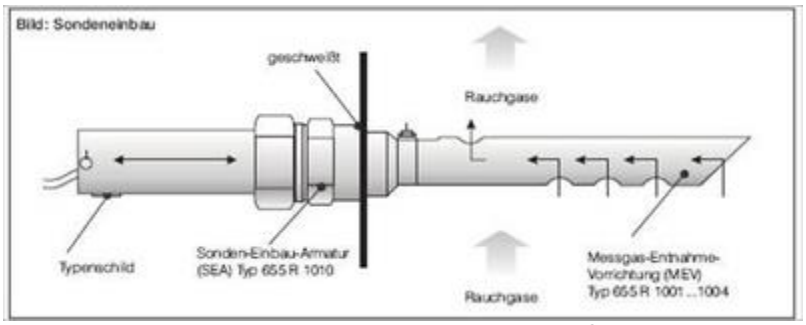
The advantages of the combined O_2 and CO regulation system are:

- Energy saving of up to 1% by means of improved optimisation at every load level
- Improved control capability as a result of a clearly shorter response time
- Independent and error-proof against infiltrated/dead air
- No measurements are made of derived characteristics but only of the actual content of unburned constituents of the waste gas.

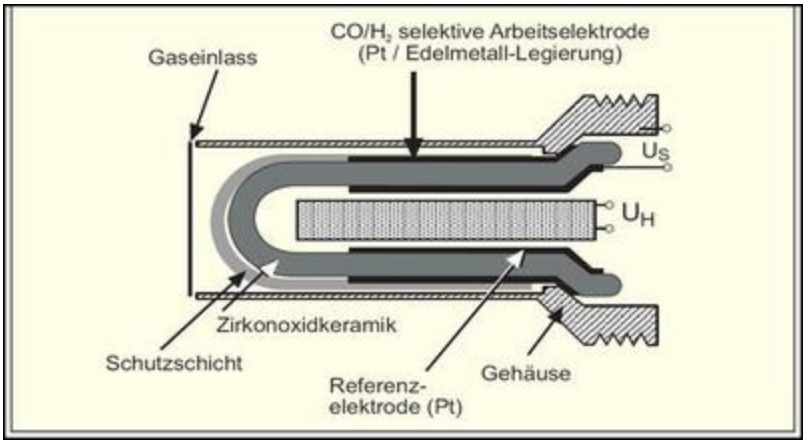


Additional components of the O_2 and CO regulation

The additional components of the O2 and CO regulation system are, for example, the combi-probe KS1 used with the device for taking samples of the waste gas.



The electrical wiring corresponds to the proven dreizler® quality standard in accordance with DIN 50156-1 with the control panel directly mounted on the burner - if required, protection type IP 54 with a plug interface can also be provided.



We would be pleased to calculate for your burner installation the possible fuel savings by a dreizler® **oxygen** and **CO** regulation on basis of your collected boiler and installation data.

Under this link you find a fill in form as a PDF-file which you can send to Fax 07424-700990 or by mail to technik(at)dreizler.com.
We look forward to hearing from you.

dreizler® oxygen and oxygen plus: Fuel saving achieved by optimal combustion conditions.

A contribution to greater efficiency made by dreizler **hightech low emission** in association with Lamtec.
Further information about Lamtec can be found from www.lamtec.de.

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