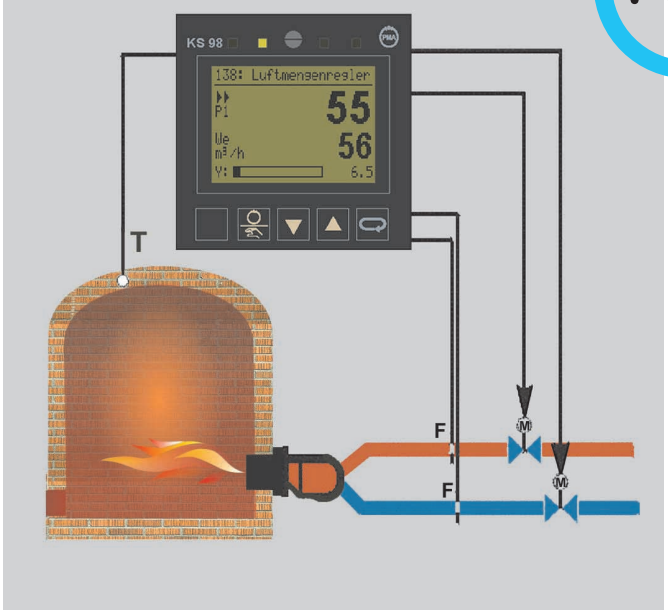


Gas burner control

KS 98 application

Gas burner control with crosswise limitation of the gas and air flows

Heating energy control

Gas/air ratio control

Ensuring excess air (lambda)

Limiting of air/gas and gas/air ratio

3 control loops in a single unit

KEY WORDS

Gas-fired heating, lambda control, fuel/air cross-limitation, burner control, flow control, multi-loop control

DESCRIPTION

To achieve stoichiometric combustion of gas, it is necessary to operate the burner with sufficient excess air. Together with a thorough turbulence of the gas/air mixture, it also ensures a low CO content in the waste gas. For this, the excess air factor „lambda“ is usually maintained at 1,2. Moreover, to make certain that sufficient excess air is available under all operating conditions (disturbance of the control valves, pressure drop in the supply, etc.) the air demand is always maximized.

One set-value for the air flow controller is provided by the temperature master controller. Another requirement is governed by the instantaneous gas flow. Consequently, the gas flow is reduced automatically in case of a disturbance in the air supply, thus maintaining the necessary lambda value.

IMPLEMENTATION

The application was solved with the multi-function unit KS 98. The KS 98 Engineering (Fig. 1) contains the three controllers required: a master/slave system consisting of the master temperature controller (T), and two slave flow controllers (F), as shown above.

Via a minimum selection function, the minimum gas demand is determined for the instantaneous heating requirement (output signal of the temperature controller), and the associated available air flow (clogged air flap). Similarly, the actual gas flow and the heating demand are used to limit the actual air flow via a maximum selection function.

By means of the scaling function, the value ranges of the output signal (0...100%), gas flow measurement, and air flow measurement are matched to the application. Furthermore, the stoichiometric ratio and „lambda“ are included in the scaling of the mutual (cross) limiting functions. The ratio controller receives the lambda value as set-point.

To ensure that operation remains practicable, scaling of the feedback signals is provided with certain tolerances. Otherwise, process oscillations (hunting) could easily result.

Via special configuration pages, the stoichiometric behaviour and lambda can be defined. Some of the parameters required for the basic control function are adjusted via the Parameter Level of the KS 98 (main menu).

ALTERNATIVES

Fig. 1 shows the basic arrangement to ensure excess air. However, several alternatives are possible.

For example, instead of a ratio- and a standard controller, it is possible to use two standard controllers for flow. In this case, the stoichiometric ratio and lambda must be included in the scaling parameters. Thus both flow controllers receive their respective external set-points via the min/max selection circuit.

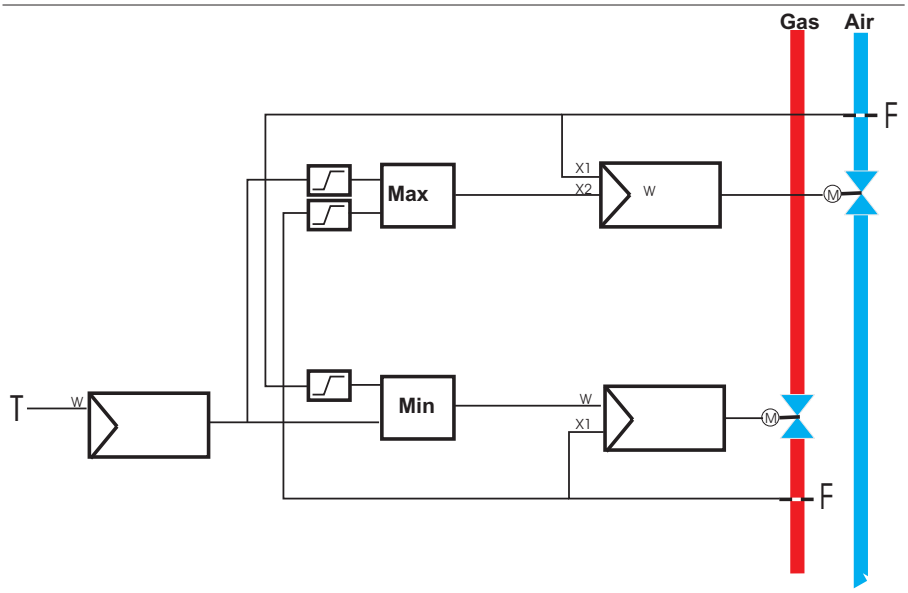
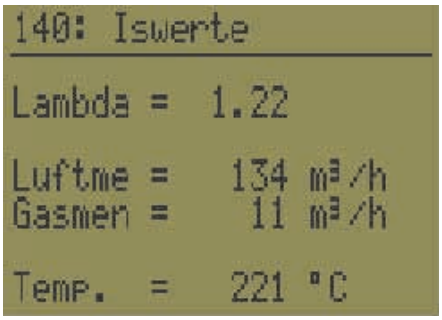


Fig. 1: Operating principle of cross limitation

Moreover, the flexible structure of the KS 98 allows several additional functions in the Engineering. For example, a load-dependent lambda correction according to a configurable characteristic, or a lambda control function based on a CO measurement in the waste gas (as described in a separate application sheet).



UNLIMITED VERSATILITY

The flexible configurability of the KS 98 enables the above application to be extended with pre-configured library functions such as password protection, timer, programmer, etc., or even „home-made“ partial Engineerings.

With additional operating screens, for example 6-line text display, trend display, and bargraphs, the projecting engineer is able to increase the plant's operational functions. Moreover, by means of a user-specific menu structure, the transparency of the process data can be adapted precisely to individual requirements.

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