KS 98 APPLICATION

Controller with sequence program

6 external devices connectable

Automatic correction of control output

Re-start inhibition

Uniform load distribution among devices

Compensation of non-operational devices

Optional counter for operating hours per device

KEY WORDS

Steam and hot-water boilers,Pumping plants (O_2 supply in aeration tanks), Compressors (compressed air supply), Cooling plants, Automatic filter plants, Switching of large heat loads (MW)

PROFILE

The operational economy of most plants is determined by the efficiency of its component devices and equipment, and is reduced considerably with sub-optimum load conditions. Therefore, it is advisable not to supply the required energy via a single large device, but to distribute it over several smaller units. Only the variations in actual demand are lined out by means of an individually controlled device. Depending on the situation, it might even be possible to do without this device, if the tolerance band of the controlled process (pressure, flow, etc.), is sufficiently wide.
By means of a suitable sequence controller, the smaller units are switched on and off in a defined order, as required by the energy demand. This ensures that each device contributes to the total energy input with optimum efficiency.

The advantages of reduced operating costs are obvious:

- Optimum operating efficiency (low energy losses)
- High availability
- Selective switching of individual devices, e.g. for maintenance and repair, without interrupting plant operation
- Cyclical operation ensures uniform operating time and wear of the devices

DETERMINING THE ENERGY REQUIREMENTS

The actual energy demand is determined by a PID controller, whose control output operates the individually-controlled device.

Increasing/decreasing demand

If the control output exceeds preset limits, this means not enough or too much energy is available to keep the process value constant. Accordingly, if the relevant set-point has not been reached and the process is responding too slowly, an additional device is switched on or off, as required.

Devices that are not available (e.g. switched off for maintenance), are skipped automatically.

Automatic correction of control output

After an additional device has been switched on or off, the output of the controlled device is corrected automatically to compensate for the changed energy flow conditions. This ensures linear process response over the entire load range.

Delayed start-up

Depending on the type of device used, maximum energy input of an additional unit might only be available after a defined start-up time. Therefore, the automatic output compensation only becomes effective after an (adjustable) start-up period. During this delay, the controller's output is maintained at its previous level to prevent excessive variations of the process value.

Parameter switch-over

Processes of the type described here, frequently exhibit a non-linear behaviour. For this reason, it is advisable to determine the optimum PID parameters for each load stage, and to activate them automatically, as required.

Counter for operating hours

If required, the operating hours of each device can be logged. Via a corresponding operating page, the individual operating hours can be displayed.

CONTROL & SEQUENCING FUNCTIONS

Inhibited re-start

To protect the devices, a unit that has just been switched off cannot be re-started before an adjustable time has elapsed.

Cyclical operation of devices

To ensure uniform wear and operating time of all units, it is advisable to operate the devices on a rotational basis at defined intervals. This can be done manually, or automatically after a preset time has elapsed.

By means of this procedure, the unit that has been in operation for the longest time during the defined cycle period is placed at the end of the sequence, which means that it will only be operated under peak loads. After a complete number of cycles, the original sequence will be reached again.

In the example described here, it is assumed that only one of the units is controlled. Of course it is also possible to have a set-up in which there is a controlled amount of energy for every load stage. In this case, not only the basic load, but also the control signal for the variable amount must be switched over.

Disturbances

The availability of every device is signalled by a contact or a logic signal.

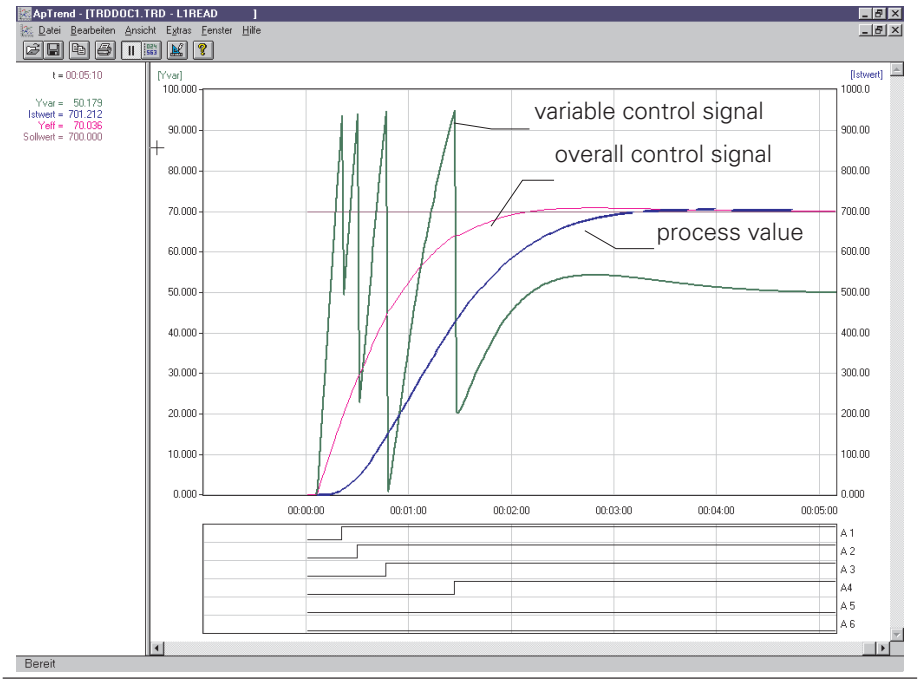
Non-operational devices

Defective or non-operational devices are skipped automatically; this applies equally for energy demand and for energy reduction

Fault during operation

If a device develops a fault during operation, the next unit in the sequence is switched on automatically. Possible variations to the energy input are compensated immediately by the control output correction feature.

Fig. 1 Various process parameters plotted against time



Renewed availability

As soon as a non-operational device can be put back into operation, the substitute unit is switched off automatically.

Operation

The controller's operating pages are called by means of a menu. The control output signal y is displayed as a bargraph and as a percentage.
If required, certain pages can be blanked or can be protected by a password.

Fig. 2 Controller operation and fault display

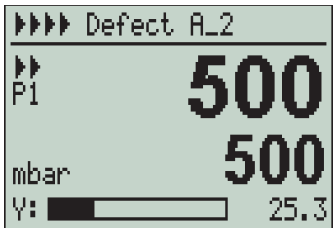


Fig. 3 Adjustment of individual energy inputs

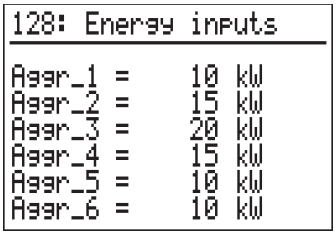
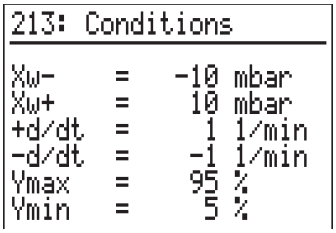


Fig. 4 Conditions for increase/decrease



Description	***Order-No.***
Engineering „Sequence program" (required once)	DIKS-ENG-98002
KS 98 standard	9407 963 11091
KS 98 with PROFIBUS-DP interface	9407-963-31091
KS 98 with INTERBUS interface	9407-963-41091

KS 98 version with 4 relays, 90...250 VAC INP3, INP4, OUT3, di/do
For other versions and detailed technical data,see KS 98 data sheet no. 9498 737 32113

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