Systematic Exhaust Gas Cleaning

Multichannel measuring devices, digital sensors, and engineering service provide efficient solutions

Washing processes for treating exhaust air are used successfully in many sectors of industry. These processes can be applied to clean single-component and multiple-component exhaust air compositions that are harmful to human health as well as exhaust air flows that are both harmful to the environment and odorous. terra-care Umwelttechnik GmbH in Recklinghausen, Germany does not only use components from JUMO in the area of measurement and control technology, but also relies on JUMO's engineering services.

terra-care Umwelttechnik GmbH prefers to use multistage systems with absorption agents and biological cleaning stages to safely and effectively comply with the legally stipulated pollutant limits. The process relies on the mass transition of soluble raw gas components and the sorbent on the one hand, and the biodegradability of many exhaust air components on the other. The high deposition rate of the washing systems means the emission limit values stipulated in the German Federal Ministry's "TA Luft" (Technical Instructions on Air Quality Control) for the protection of the environment, nature, and reactor safety or BImSchV (Germany's Federal Emissions Protection Act) can be reliably reached and guaranteed.

The raw gas is fed to the washer system and guided through the column. The aerosols that are carried along are removed from the treated exhaust air stream by a demister before being routed into the next cleaning stage. To minimize operating material costs, the solvent is recycled, continually checked with measurement technology, and, if necessary, chemically balanced. Process engineering in the biological cleaning stage can be viewed as an equivalent. However, here, the biodegradable materials are reduced using microbacterial implementation mechanisms.

The safe functionality of the plant depends to a large extent on the controllable operating parameters of the installation parts and the water quality. For this reason, the entire system is exclusively monitored and controlled using JUMO's measurement and control technology components. The setup of the control system was developed in coordination between the engineers from terra-care Umwelttechnik GmbH and the JUMO Engineering department. The JUMO Engineering team bundles decades of experience in industrial measurement, control, and automation technology. This team supports customers throughout the entire project handling and develops customized applications for a variety of industries.

In the plants of terra-care Umwelttechnik GmbH the following cleaning stages

- Conductivity
- Water temperature
- Oxygen content
- pH value
- Level
- Differential pressure
- Inlet air temperature

are measured and evaluated with the JUMO AQUIS touch. The multichannel measuring device forms the central platform for displaying and processing the corresponding sensor signals. JUMO AQUIS touch P covers the measuring, controlling, recording, and displaying tasks with one single device. Two analysis parameters can be directly connected and an additional five can be connected as standard signals. Digital interfaces enable additional eight external measured values to be supplied. Flow measurement, including quantity determination, is also possible. The parameters are displayed on a 3.5 inch color monitor with touchscreen on which the operation and settings of the device are handled.

The integrated paperless recorder allows simultaneous recording of up to eight analog and six binary signals. The storage of the data occurs in a tamper-proof fashion and enables official record-keeping requirements to be met without additional devices. Stored data can be extracted through a PC program via Ethernet or a USB flash drive. The data can then be further processed with a separate software.

A process schematic and a tabular list of all the measurement parameters support the operator in the form of a chart on the screen of the JUMO AQUIS touch. Depending on the displayed measured values the water quality is ensured along with a response initiated by the control system in case of high load.

Similarly, the circulation pump and fan outputs are controlled so that the whole system works independently and without any operator involvement. The important data is also evaluated through automated processes. Furthermore, the innovative JUMO digiLine system is used to measure the oxygen content. JUMO digiLine is a bus-compatible connection system for digital sensors in liquid analysis that gives users the ability to build intelligent sensor networks. Only a single digital signal line is routed to the evaluation unit or controller. This enables more efficient and faster cabling of plants in which several parameters need to be measured simultaneously at various locations.

Contact:
Harald Schöppner
JUMO GmbH & Co. KG, Fulda, Germany
Phone: +49 661 6003-2295
harald.schoeppner@jumo.net
www.jumo.net

Fig. 1: Harald Schöppner

Fig. 2: Installation situation

Fig. 3: Complete plant

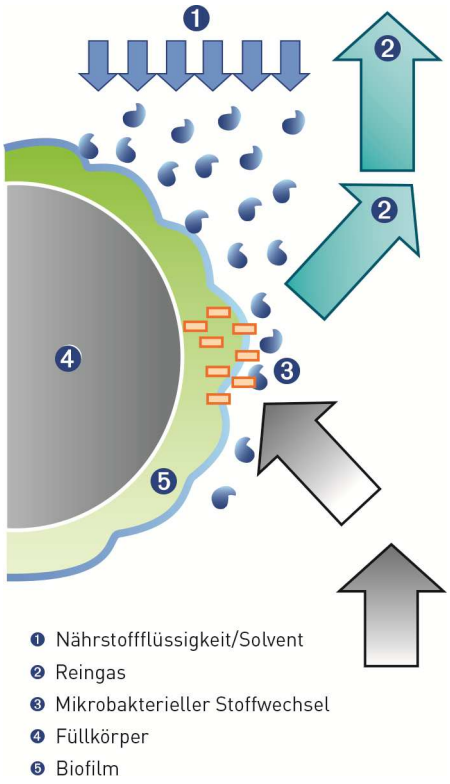

Fig. 4: Principle of exhaust air cleaning

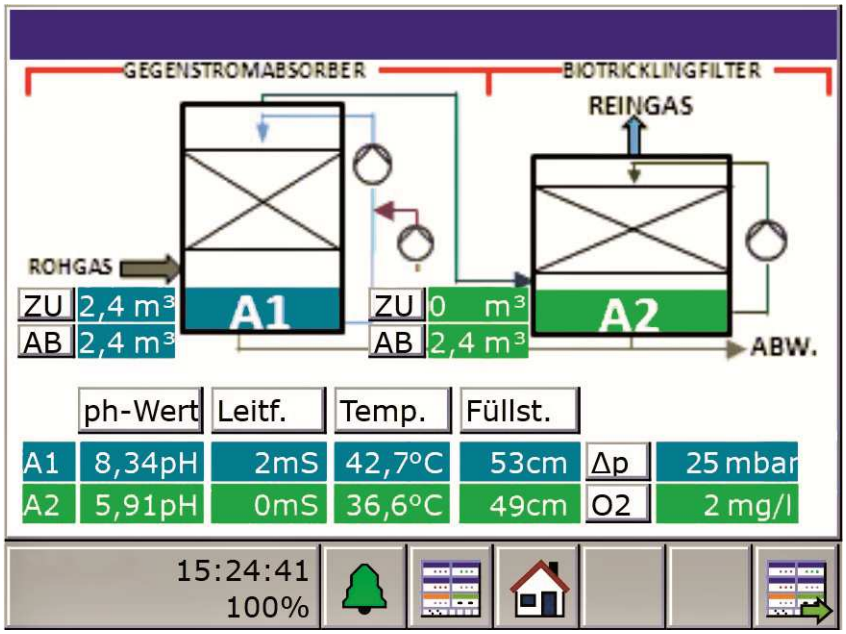

Fig. 5: Process screen 1

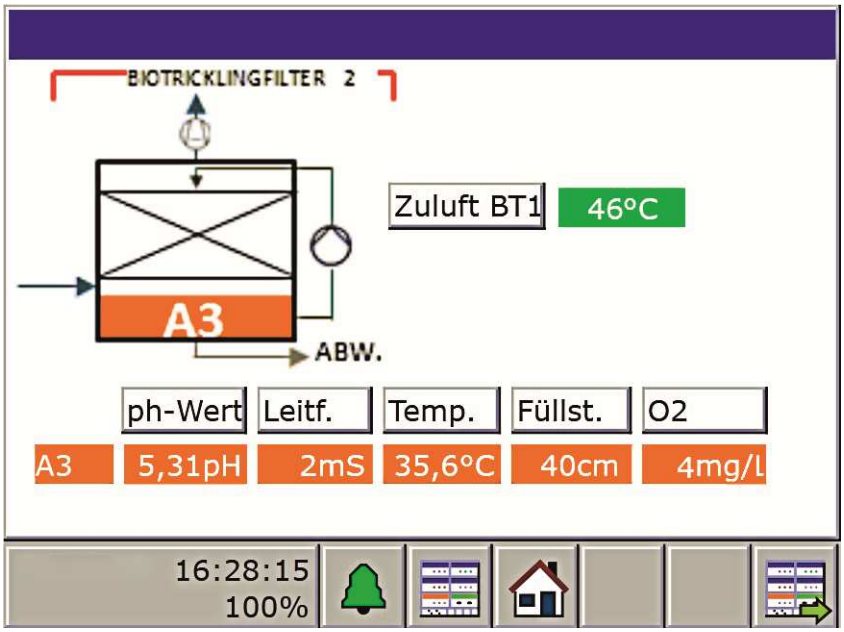

Fig. 6: Process screen 2