



Vinegar Infos

The modern Production of Alcohol Vinegar

Frings offers a number of fermentation processes for the production of the product that suits your market needs. The main difference between the Frings-developed processes lies in the acidity of the final product. Rule of thumb: the higher the final acidity, the higher the precision required for the process control.

All vinegar fermentation processes require control of one all important variable:

Alcohol Concentration.

Following the world's first online alcohol monitor system, the ALKOGRAF, FRINGS has recently developed the ALKOSENS II, combined with a micro-computer, the ACETOMAT III. These instruments are the core of the FRINGS fermentation control systems for the automation of any vinegar production process.

The ACETOMAT controls the start of discharge according to alcohol concentration set point, calculates the rate at which fermentation takes place, and offers an ideal overview of up to 144 hours of fermenter activity in the form of graphs and tables. Three to five fermentation cycles may thus be compared at a time.

Nearly all modern FRINGS ACETATORS are now equipped with a **fully automatic fermentation control system**. The following systems are available:

Frings Acetomat III CC (control center)
FRINGS-ACETOCNTROL.

Both systems secure the control of standard fermentation processes for the production of vinegar up to 14.5% acidity, using mash prepared manually (from alcohol, water and nutrients), or automatically with the ALCOHOL-WATER-MIXER and the NUTRIENT DOSING SYSTEM.

A special, additional measuring and control system is applied in all high strength processes, which produce vinegar with 15 % acidity or more.

The most sophisticated vinegar production system is required for the dual stage high strength fermentation process. Two ACETATORS are run in sequential fermentation with acid concentrations of up to 20.5%. Specially developed, highly sophisticated, state of the art measuring and control equipment guarantees the

best possible environment for the acetic acid bacteria even under the severe and stressful conditions of this process.

The Frings ACETATOR Control Systems

Process control systems using computers and programmable logic controls (PLCs) are well introduced in modern food production and are part of most well performing plants. They ensure economical production with a low product loss at an always high quality level of the produced vinegar.

FRINGS offers a modular concept by which the vinegar manufacturer can introduce modern control technology step by step at reasonable prices. The aim of each of the proposed modules is to reduce costs, work, and worries for you and your staff.

The Frings Acetomat III - Family

Frings ACETOMAT III with ALKOSENS

This user-friendly basic control system (4 keys, LCD) measures the alcohol concentration and, as it is combined with a special temperature sensor type PT100, the temperature within the fermentation liquid. The measured information is transferred to the control panel as an analog or digital signal, and activates the discharge and thus the automatic cycle change at the proper--and for the bacteria--ideal moment.

The ACETOMAT III combined with the control panel controls the complete fermentation process, including the necessary cooling. The signals for temperature and alcohol concentration can be recorded by a line recorder.

A data memory for alcohol concentration, temperature, alarms, time, etc. automatically records the course of the last 3 - 5 cycles (from discharge to discharge).

Frings ACETOMAT III CC with ALKOSENS

Even the basic version of the ACETOMAT III CC offers a great variety of additional functions and process information. Two additional pressure sensors, for instance, register the filling level in the fermenter. Altogether 8 digital inputs and outputs take care of a nearly complete automation of the production process. The motors are controlled via a separate power panel.



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The control program reflects more than 13 years of experience, with a great number of safety functions in the background, and our specialists are working hard at an additional personal computer compatible version with a corresponding evaluation module and a data transfer program.

Process controlled: Batch process up to 15% acidity in the final product.

Frings ACETOCNTROL

The core of the control center is a programmable logic control system (PLC), which evaluates all sensor data and combines it into a suitable fermentation control for the particular process concerned. The variable parameters are entered into the PLC via a touch screen, where they are displayed and may be changed if necessary.

All components are installed in a stainless steel cabinet, which may be set up close to the ACETATOR. Optional versions exclude the normally integrated power panel, which is then provided by the customer or FRINGS as a separate cabinet.

Processes controlled:

- Continuous process for fruit vinegar up to 9% acidity
- Batch process up to 14.5% acidity
- Batch process with automatic mash preparation (10 - 14.5% acidity)
- Single stage high strength process with automatic mash preparation (17.5% acidity)
- Dual stage high strength process with automatic mash preparation (up to 20.5% acidity)
- Dual stage standard process for wine vinegar without residual alcohol

Frings Fermentations Control System (FFC)

For an even more comprehensive control of all fermentation processes, the ACETOCNTROL can be upgraded by a FRINGS computer control system type FFC - a software program which is installed in a computer of the customer's own choice (operating system Windows NT) anywhere in the production facility.

Its most important characteristic is the installed software package for application and visualization.

The system can be connected with several ACETATORS, even if they are located at different places. The integrated software offers the opportunity to communicate with all connected ACETATORS from a central control room and to keep in touch with the production anywhere in the world. Teleservice, remote diagnosis, remote maintenance are key possibilities. A comprehensive evaluation and recording module completes the offer.

The Frings Processes for the Production of Quality Vinegar

Continuous Process for Low Concentration Cider and Wine Fermentations

This economical process is run at a constant, low alcohol level with practically continuous charging and discharging procedures (overflow without discharge pump).

Traditional Batch Process, With Mash Tank, for Maximum Acidities of 14.5

Precalculated quantities of alcohol, water, and nutrients are manually or automatically filled into a large mash tank, where they undergo intensive mixing. The control system takes care of the cooling, the initiation of discharge by alcohol concentration, and the automatic addition of the adequate quantity of mash with the aid of filling level sensors.

Notwendige Ausstattung:

Frings Acetator oder Fermenter mit modernem Belüftungs- und Vertikalentschäumer- System, Acetozym Dsplus, Spezialbakterienkultur, Maischetank

Traditionelles Chargenverfahren ohne Maischetank bis 14,5% Säure

Alkohol und Nährstoffe werden getrennt vom Prozeßwasser dosiert. Die Steuerung überwacht neben der Temperatur den Alkoholgehalt sowie die dosierte Alkoholmenge und dosiert Wasser und Alkohol nach den Vorgaben des Betreibers. Eine voreingestellte Menge Nährstofflösung wird über die automatische Frings Nährstoffdosierung dreimal während einer Charge dosiert.

Equipment:

Frings ACETATOR or any other fermenter equipped with a modern aeration system plus a vertical defoamer, use of Acetozym DSplus, special bacteria culture, and mash tank.



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Traditional Batch Process, Without Mash Tank, for Maximum Acidities of 14.5%

Alcohol and nutrients are added separately from the process water. The control system supervises the temperature, the alcohol concentration and the added quantity of alcohol, and controls the addition of water in accordance with the instructions of the user. Also controlled is the discharge sequence by alcohol concentration. A preset quantity of nutrients solution is added each cycle by help of the automatic nutrient dosing equipment.

Equipment:

Frings ACETATOR or any other fermenter equipped with a modern aeration system plus vertical defoamer, Acetozym DSplus, special bacteria culture, alcohol addition system with pump and flow meter, process water system, nutrient dosing system.

Advantages:

Hygienic fermentation process, optimum nutrient dosing, no mash tank required.

It is also possible to opt for an integrated nutrient dosing system.

Additional advantage:

Investment even lower.

Single-Stage High-Strength Process

Once calculated quantities of alcohol, water and nutrients are added automatically to the connected ACETATOR, the ACETOCONTROL system will control the temperature as well as the addition of nutrients, process water, and alcohol. The total concentration of the fermenting liquid inside the ACETATOR is controlled in such a way that it is initially raised very carefully and subsequently reduced rather quickly. Discharge is controlled by alcohol concentration.

Equipment:

Modern FRINGS ACETATOR with high performance aerator, high performance defoamer, specially adapted bacteria culture, nutrient of Acetozym DSplus, alcohol and water supply lines, nutrient dosing system (either integrated or separate).

Advantages:

Up to 17.5% acidity possible, consequently less storage space and transport costs, low residual alcohol, and suppression of bacteriophages.

Dual Stage High Strength Fermentation Process:

To obtain the highest acidities, two Acetators are combined. A larger Acetator transfers a certain volume of its fermenting liquid to a smaller Acetator (size ratio: 3:2). The bacteria population within the larger Acetator is supplied with alcohol and nutrients at such rates that the highest possible total concentration is reached without jeopardizing the metabolic activity. The transfer is made at an alcohol concentration which on the one hand optimizes the cycle time of both ACETATORS and on the other hand makes sure that all of the alcohol is oxidized into acetic acid. To support this aim further, alcohol and nutrients may be added into the second Acetator if the rate of acidification in this Acetator is at an acceptable level.

Equipment:

In addition to the equipment for the single stage process: second fermenter with high performance aerator, adapted bacteria culture, transfer piping, and rinsing system.

Advantages:

Up to 20.5% acidity possible (new markets), no additional equipment needed to concentrate the vinegar any further.

Functions of the Acetocontrol

- Precise and trouble free dosing of alcohol by appropriate flow meters
- Foam control by foam sensor
- Supervision and control of liquid streams by flow meters, level sensors, and motorized valves
- Visualization of all process parameters on a touch sensitive screen

Additional Functions of ACETOMAT III CC

- Variety of safety functions such as emergency charging while discharging
- Temperature control by control equipment or by PID controller
- Differential signal from two pressure probes provides a reliable level reading
- Alarm for activation of remote alarm systems, text visualization of all alarm messages
- Mechanical overflow protection



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- Control of aspirated air volume
- LCD visualization of all process parameters

Features of the PROCESS CONTROL SYSTEM FFC

- Calculation of process parameters and setpoints according to the production values of the user
- User-friendly, mouse-supported visualization system
- Filing of all user transactions during fermentation cycle to computer storage file
- All units can be operated manually or automatically through the central processing system

Options:

Teleservice (remote diagnosis, remote maintenance) via remote data transfer

Further proven Automation Components

The Frings Nutrient Dosing System

The precise and continuous provision of the bacteria with vital nutrients is reliably ensured by the FRINGS Nutrient Dosing System. At irregular intervals, this system adds a defined amount of nutrient concentrate (solution of nutrients powder, mixed with filtered vinegar) through the charging line directly into the ACETATOR.

With a fully automatic nutrient dosing system, up to 6 fermenters can be supplied with bacteria nutrients. You save time and money without the laborious mixing and addition of nutrient solution into the mash tank. A further advantage is the improved hygienic conditions compared with the traditional method of nutrient preparation.

The integrated nutrient dosing system serves one particular fermenter only. In a tank, which is provided with an agitator, the nutrients (Acetozym DSplus, dissolved in filtered vinegar) are mixed and transferred automatically into the fermenter through the alcohol charging line. The modern nutrient FRINGS Acetozym DSplus accommodates a concentration from 1:3 to 1:5 (1 part Dsplus to 3-5 parts liquid).

Frings Alcohol-Water-Mixer

This system mixes, in a fully automatic procedure, denatured alcohol into a mash tank, until the desired

strength is obtained. An automatic filling level control ensures a permanently sufficient liquid volume in the tank. The system is recommended for large plants with more than 4 ACETATORS. One optional design provides for the automatic and practically parallel mixing of two mashes of different alcoholic strengths into two separate tanks.

Filtration

For a most profitable filtration of vinegar we recommend the FRINGS Crossflow Micro-Filtration Plants. These plants can be relied upon to deliver high performance in filtration and a high yield in production over an enviably long period of time.

The filtration modules installed in each unit are made of an extremely robust material and have proven their longevity in many applications.

FRINGS offers filtration plants for your specific demands in semi- or fully automatic versions.