





ODE srl



# *Exciting & Innovative Applications for the New ODE Angle Seat Valves (ASV)*





# Applications: Hair and Fluids

## Application

When producing hair dyes, hair tints and other hair care products, various substances, intermediate products and dye colours are mixed. As different recipes are required for the different types of hair and dye variants various batches are produced. The product quantity produced depends on the size of the respective mixing tank.

## Plant design

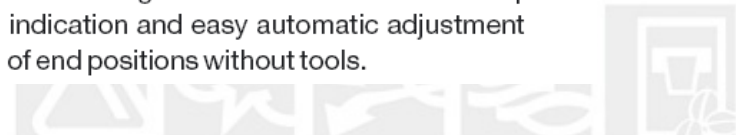
The individual ingredients are pumped from storage tanks and passed into a stainless steel mixing tank depending on the recipes. The mixing tank is a stable pressure vessel with integrated agitator and an input pipeline conveying the media, an output pipeline conveying the product and a cleaning pipeline. As the final product and its ingredients may be chemically aggressive, this installation is made of stainless steel. As the media does not contain particles, pneumatically operated metal globe valves are suitable for this application. The installation is fully automated and all its components are permanently monitored.

## Solution

Pneumatically operated metal globe valves in sizes DN 15 to DN 25 are used for the



control of media feed, product removal and cleaning agents. When space is at a premium valves with a flat piston actuator can be used as an alternative. pilot valves are directly mounted on the process valves enabling manual compressed air control directly at the valve in case of a power or control system failure. This allows finishing the production of a batch in case of emergency. For optical control of the working pressure applied to the solenoid coils, the solenoids are equipped with a signal lamp. The positions of the valves are monitored by electrical position indicators. The application can be optimized by using the new electrical position indicator. In addition to electrical transmission of the end positions its outstanding features include standard optical indication and easy automatic adjustment of end positions without tools.





# Applications: Water

## Plant technology

Valves are required to be insensitive to contamination to a certain degree, depending on the kind of raw water used. For this reason butterfly valves may only be used after the raw water has been tested. The use of diaphragm valves, however, is generally recommended. In addition, pressure pick-ups or pressure sensors are required for cyclic control and wiring of the filtering devices. The more the filter inserts are contaminated, the more the preliminary pressure "p1" increases within the piping system. If the set variable is reached or even exceeded, there has to be a change-over to an alternative filter. The contaminated filter inserts are then changed or cleaned in a backwash process. The materials used are PVC-U, PP, PA, steel and sometimes stainless steel. The piping nominal sizes depend on the amount of water to be filtered, and usually start at DN 15 but are rarely larger than DN 300.

Filters are usually used in pairs in order to avoid any interruption/malfunction of the filtration process caused by choking and/or too much particle concentration.



## Application

Particle filtration of water is used for separating water from the particulate matters it contains. This particulate matter can be sand, mud, precipitations, iron, manganese, biological contaminants or other suspended matters and particles. Particle filtration is often the first step in the different stages in water treatment, especially when water is taken from rivers, lakes, wells or contaminated systems. When waste water is mechanically cleaned filters are also used. The filters used are gravel, sand, plastic and ceramic inserts as well as mineral granules. Basically the first filtration step is only a mechanical process. Chemically bound matters can only be extracted under certain circumstances or not at all in most cases. This type of filtration and fine, micro or ultra filtration must not be confused. In these latter processes, water of the highest possible purity can be produced, e.g. by reverse osmosis or distillation. Particle filtered water is required in waterworks, hospitals, laundries, beverage production and in industry.







# Applications: Pharmaceutical

## Application

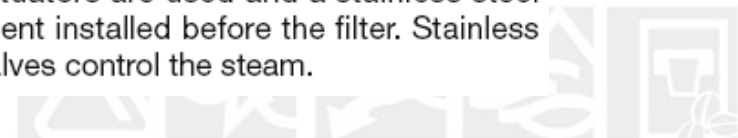
Sterile air filters are needed for dairy technology and also for other sterile processes such as in the pharmaceutical industry. They serve, for example, to bleed piping systems after steam sterilisation, to ventilate containers and tanks when the filling levels vary or to decontaminate laminar flow of air in order to hinder that system components which are to be kept sterile come into contact with the contaminated atmosphere. Generally speaking, sterile air filters serve as an interface between a sterile area and the surrounding atmosphere. Therefore they must be viewed as an especially important part of a sterile system and their function significantly influences the quality of the product. The weaknesses of the sterile air filters are often insufficient monitoring, contaminated condensate and, above all, a working life which is too low. Under Martin Barnickel's management, the Lehr- und Versuchsanstalt des Fachzentrums für Milchwirtschaft [Teaching and Research Institute of the Competence Centre for Dairy Farming] in Kempten has looked closely at this task and taken it up together with the industry. After analysis of the technical status and an intensive development and testing phase, a sterile air node was developed which was constructively and functionally designed to achieve optimum operating safety and filter working life according to today's state of the art technology. In this case, the filter elements survive in excess of 230 sterilisation cycles in reproducible experiments.



## Plant design

In order to reduce the distance on the sterile air side, avoid deadlegs and to operate the steam line without puddles and without condensate banking, as many functions as possible are grouped in one central valve block. It is based on the diaphragm valve principle through which all the mechanical valve parts are located outside the media-wetted area and only smooth internal geometries prevail. The sterile air line is steam pre-heated in order to avoid the formation of condensate. A defined gradient serves for dehydration purposes. Diaphragm valves are

always installed before the condensate charge eliminators. In order to deal with unfavourable and changing pressure situations, regulated valves with motorised actuators are used and a stainless steel sintered element installed before the filter. Stainless steel globe valves control the steam.





# Applications: Food

## Application

In order to preserve food, paints, drugs or other hydrous substances and / or to powder them, they must be partly or completely dehydrated. The procedure used is a combination of vacuum and cold. As the amount of the required product and the properties of the products as well as the on-site conditions may be very different, not only a large number of standardized installations are used but also individually specified installations.

## Plant design

Compressors are used to compress a cooling medium which is then decompressed. This can be compared to the functioning of a refrigerator. When the cooling medium loses its tension, energy is released in the form of cold. This cold is then passed into a cabinet and cools down the products contained. The humidity in the cabinet is released using a vacuum and the condensate is carried off. Nitrogen is used to achieve deeper freezing temperatures and to optimally influence the crystalline structures of the product.

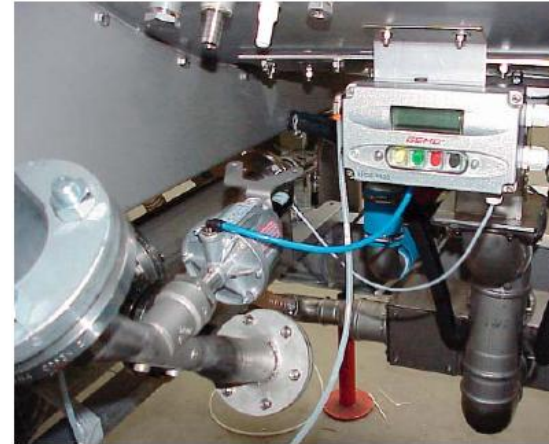




# Applications: Laundry

## Application

Large quantities of laundry arise in hospitals, convalescent homes, clinical centres and also in large companies. This can be bed linen, working clothes, hand towels and bath towels or similar. Machines as used in private households are by no means adequate to master these quantities. There are washing machines which are specially adapted to the users' needs to wash to this capacity. They can either be designed to cope with a defined capacity or can be permanently loaded as an automated washing system. The water which is provided with corresponding cleaning agents for cleaning purposes must be treated initially. In accordance with the available water quality and the nature of soiling and the cleanliness / hygiene to be achieved, a wide variety of water treatment steps are necessary, such as demineralisation for example and/or ion exchange. Moreover, the water temperature also plays an important role. The application example illustrated shows the regulated hot water feed to the washing zone.



## Plant design

When commencing the washing process, the machine is initially partly filled with hot water using a control valve. Following this, cold water is fed in using another control valve until the temperature required is reached. This process is called "cool down". The machine is only fed with the dirty laundry following this. As the required temperature changes again dependent on the type and quantity of laundry during filling and operation, both control systems are used for automatic further hot or cold water regulation as required. This ensures adherence to the preset temperature during the entire laundry process.







# Applications: Laundry

## Application

The industrial laundry service introduced here has earned itself a good reputation within the North American health system for several decades now. Its user washes the bed linen, the operating theatre linen and also the patients' and staff laundry for several hospitals in the country. In order to ensure that possible biological impurities are removed as well as the normal dirt, both cleaning additives and hot water (up to 95° C) are used for the washing process. The water used in this system has a high iron content and therefore has a highly corrosive effect on the materials used.



## Plant design

The laundry is washed in individual industrial machines. The machines are loaded manually from classical laundry trolleys. For this purpose, the machine is tilted forward a little in order to make the loading opening better accessible. After the washing process has been completed, the machine is fully inclined forward and the clean laundry tipped into the respective vats. They are used to transport the clean laundry to the next department for further processing. The laundry runs 24 hours a day, 7 days per week and one wash takes approx. 1 hour.



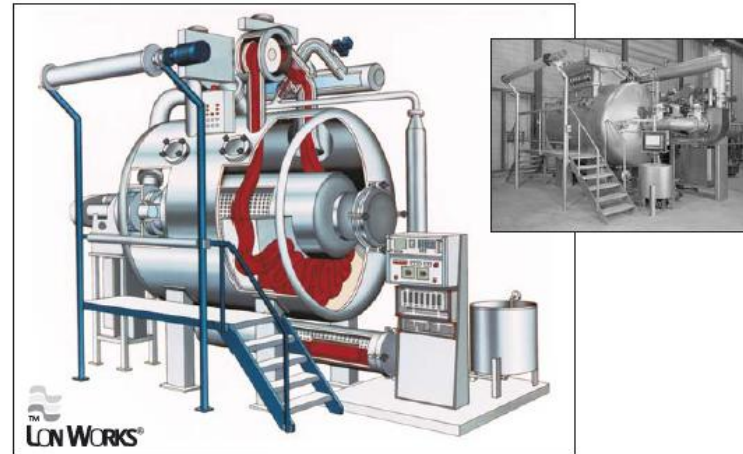




# Applications: Water and Steam

## Application

A "nozzle" dyeing machine with aerodynamic systems for liquors with low water, chemicals and energy consumption is used for bleaching and dyeing of all kinds of knitted and woven fabrics. In the vicinity of this machine there are also other applications such as liquor piece dyeing machines, colour mixing stations, finishing machines for fabrics and drying machines as well as various other machines for fabrics processing. In order to render the control of the plants more effective, the individual processes are automated by control software. The whole application, ranging from storage, mixing and dosing of colours to processing procedures, is controlled by one software. In order to have constant digital concept, it is also necessary to integrate process valves into this cycle. This implies that the valves also have to be actuated, regulated and controlled digitally. The working pressures are 4-5 bars and the maximum working temperatures are between +20°C and +180° C and there may be quick temperature variations in the whole application. The available control pressure is 5.5 bars and the working media are various aqueous solutions. All valves are made of rustproof stainless steel. For digital control, regulating and sensor signals the LONWORKS bus system



This bus system has the advantage of enabling a lot of connections within a network. In addition, the data can be transmitted worldwide so that telediagnostic service and programming are possible.





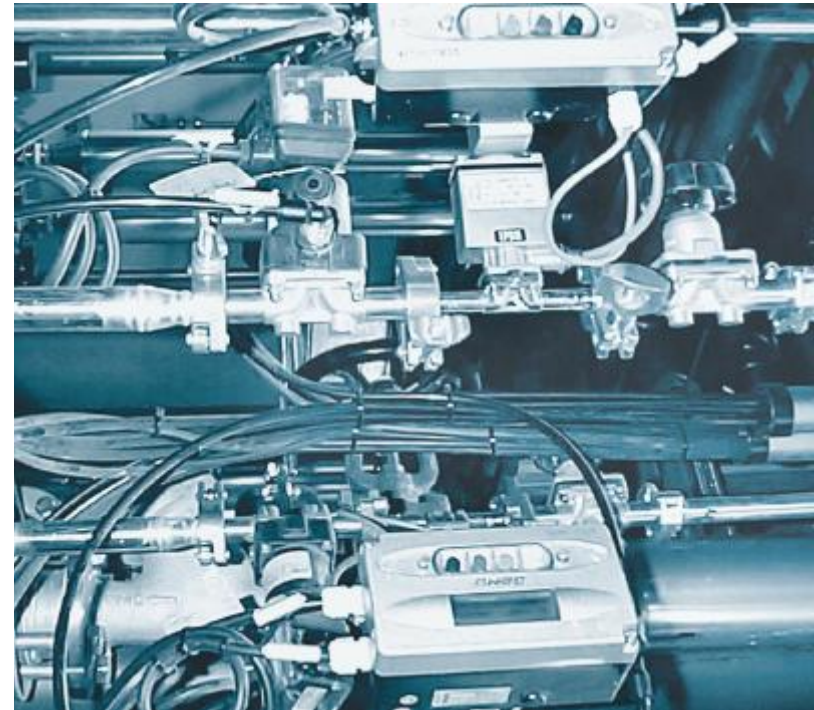
# Applications: Pneumatic control

## Application

In a production plant for animal drugs there are various controlled systems to ensure that the proportion of the individual product ingredients in the mixing tanks has been set depending on the recipe. The plant is subject to requirements similar to those in the human pharmaceutical industry namely minimum dead legs, self-draining and easy cleanability. A special demand in this application is that the control valves are small and that the positioners cannot always be directly mounted to the valves.

## Plant design

The application is pneumatically controlled and completely electronically monitored. All the controlled systems consist of the actual control valve, a pneumatic safety valve and a manual valve for the fine adjustment of the pressure difference within the controlled system. This arrangement also enables the control valve to be operated when there is no pressure. All valves can easily be removed from the pipeline by means of clamp connections.





# Applications: Solar Cells





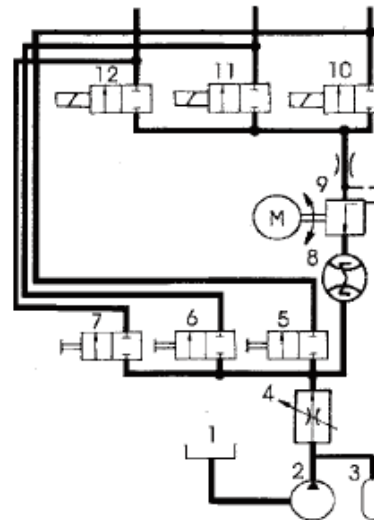


# Applications: Agriculture

## Application

The 1997 final class of the technical college in Crailsheim won the Baden-Württemberg competition JUGEND FORSCHT (young people doing research work) with their micro-controlled field sprayer. In the federal German competition in 1998 they took the third place and won the special price for protection of the environment.

In procedures used so far, the spray concentration is mechanically controlled by the number of revolutions of the drive shaft of the tractor. Driving slowly in a low gear inevitably results in an excessive concentration of pesticides, whereas driving relatively fast in a high gear, the spray emission is disproportionately weak. In the first case the environment and the sprayed plants are negatively affected. In the second case the protective function of the spray may be too weak and thus potential ineffective.

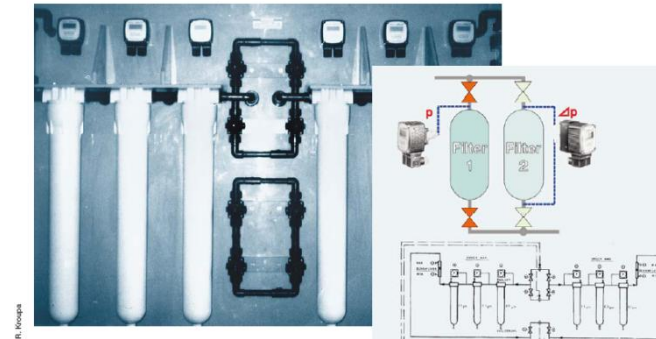




# Applications: Water and Fluids Threatment

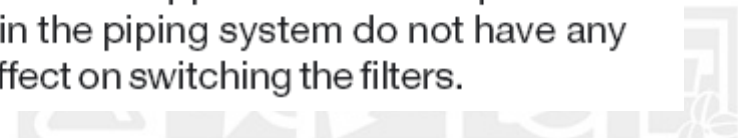
## Application

Filtering impurities and particles from a liquid working medium wears out the filter. Its service life depends on the degree of contamination and the flow rate of the medium as well as on its own nature. If only one filter is installed in a pipeline, the installation has to be shut down at planned intervals. In order to avoid shutdowns alternate filters are installed in most cases. If filter 1 is blocked by particles there is an automatic switch to filter 2 enabling the blocked filter to be either exchanged or cleaned by back flow. This allows the installation to be continuously operated. Filter installations are used in the most varied areas of application, such as in water treatment, in the chemical and beverage industries and in all sectors of industry.



## Plant design

There are two ways of monitoring filters by pressure measurement. With the first variant a pressure pick-up is installed at the filter entry. The pressure in this pipe section increases depending on the blockage condition of the filter insert. Switching to the second filter and cleaning of the first filter is controlled by setting a limiting value. With the second variant, the pressure before and after the filter is measured. When the filter insert is blocked, the differential pressure between filter inlet and outlet increases. When a set value is reached, the system automatically switches to the second filter as described with the first variant. The advantage of this application is that pressure variations in the piping system do not have any negative effect on switching the filters.





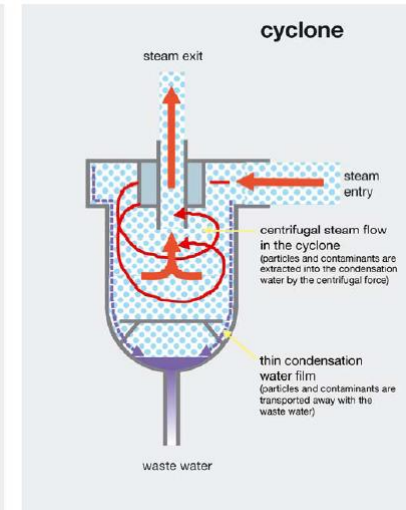
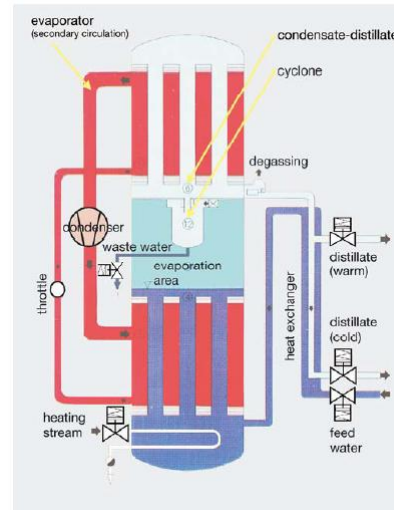
# Applications: Purified Water

## Application

For the manufacture of drugs administered to the human body by injection or transfusion only specially purified water known as Water for Injection (WFI) may be used according to the relevant regulations e.g. FDA (Food and Drug Administration). It must not contain any components damaging to one's health, must be highly pure and free from volatile matters. Especially those which cannot be removed by filters. If the distillation feed water is high purity and/or deionized water, the percentage purity of the steam is considerably increased and it is practically free from foreign ionogenic matters, germs and pyrogens. When using a cyclone and the centrifugal force it produces, unwanted matters are extracted and the steam produced in this procedure is degassed and cooled. The condensate of this sterile steam can then be used as WFI water for pharmaceutical processes and the manufacture of drugs.

## Plant technology

The distillation plant described below not only produces steam by heat but also uses a cyclone. After the evaporation of the deionized feed water it centrifuges the steam to a 500 fold acceleration using gravity to extract particles it may contain. The separation grade of the cyclone is  $5^{10}$ - $6^{10}$  and separates particles down to a diameter of  $0.5 \mu\text{m}$ . Due to the adhesive and coagulative effect of the water drops even smaller droplets are removed which are moved to a collector at the bottom of the cyclone and carried off the plant as waste water. Then the steam is degassed so that the liquid portion of the steam can be conducted through the spiral double pipe heat exchanger and cooled down. The new incoming feed water flows round the outlet pipe. On the one hand the outgoing high purity water is cooled to the required



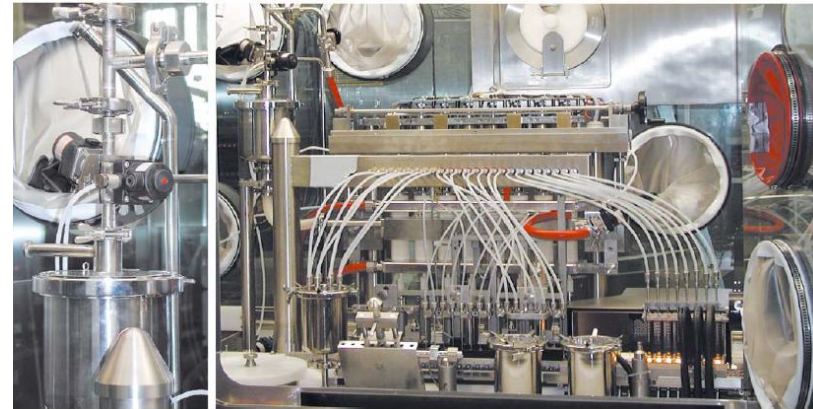




# Applications: Filling of liquids

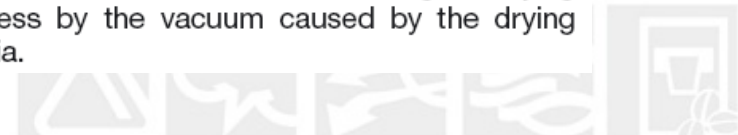
## Application

Filling medium and large quantities of an aseptic pharmaceutical product such as rinsing liquid used in operating theatres or blood substitutes is a difficult task, but an even greater challenge for filling machines is the filling of very small quantities. These include portioned active substances which are sometimes freeze-dried in glass containers with a lid or as a liquid in sealed glass ampoules. These mostly contain an active substance such as a medicine for stabilizing blood circulation or a vaccine. As the filling process must take place under special hygienic and aseptic conditions, the filling equipment must either be located in specially protected rooms or, to an increasing degree, directly integrated into a housing. This offers the required safety, is cost effective and the location is selectable.



## Plant Design

As the small glass bottles / ampoules must be cleaned and sterilized immediately before being filled, the filling process always takes place in combination with cleaning and sterilization steps. The filling machines are always equipped with CIP/SIP cleaning units enabling cleaning and sterilization after finishing a filling batch without alteration to the machines. The product is dosed in a preliminary tank / buffer where its level is monitored and taken from there using a piston dosing pump. It is then injected into the small glass bottles / ampoules via a distribution nozzle. The ampoules are then directly sealed and the small glass bottles are closed by a sterile plug. With the products which are freeze-dried the aseptic plug is placed lightly into the bottle so that it is pulled down into the bottle during the drying process by the vacuum caused by the drying media.





# Applications: Life Science



## Application

A German life science specialist designed, constructed and commissioned a complete production line for manufacturing infusion solutions for Russia. The plant consists of water treatment, a preparation system for sodium chloride and glucose solutions and for bottling. According to GMP standards, 2,400 bottles are filled per hour (12-16 million bottles per year). In order to do without fragile and heavy glass bottles, locally manufactured plastic bottles are used which are manufactured using the BFS process.

## Plant design

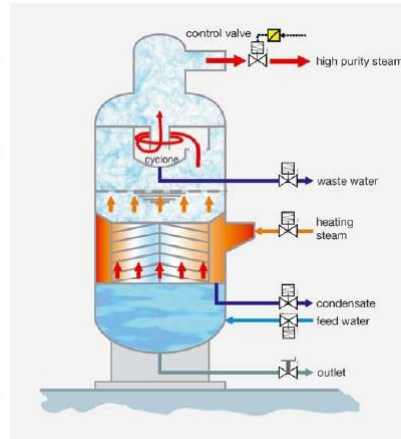
Infusion container manufacturing is integrated in the bottling system. The Blow-Fill-Seal technology (BFS) forms the container initially from a hot extruded plastic tube, then fills and seals it airtight immediately. In order to ensure continuous flow, the infusion solutions are made available using a regulated volume flow. The process variable is entered and analysed together with the other parameters in a central control system. Dependent on the current operating position, a set value is specified for an electro-pneumatic positioner in order to adapt the valve position to the current respective situation. By doing this, a balance is achieved for the ratio between the requirements and the availability of the solution. Moreover, the buffer container need not be too highly dimensioned. The bottling system also includes an integrated cleaning and sterilisation system.







# Applications: Steam



## Application

The quality of standard process steam is not sufficient for the sterilization of installations in the pharmaceutical industry because the portion of contaminants, particles, hydrazine, phosphates and similar components (corrosion inhibitors) is too high. A special process steam must be used for drugs in compliance with relevant regulations e.g. FDA (Food and Drug Administration). This process steam must not contain any of these components and in addition it must be free from volatile matters which cannot be removed by filtration. By feeding the installation with deionized water the percentage purity of the steam is increased so that it is practically free from foreign ionogenic matters. In addition the steam is germ-free, too. When using a cyclone and the centrifugal force it produces, unwanted matter is extracted. The steam produced in this procedure can be used for sterilization and autoclaving of pharmaceutical installations.

## Plant technology

The distillation plant described in the following not only produces steam by heat but also uses a cyclone. After the evaporation of the deionized feed water it centrifuges the steam to a 500 fold acceleration using gravity to extract particles it may contain. The separation grade of the cyclone is  $5^{1^0}6^{1^0}$ . It separates particles down to a diameter of  $0.7 \mu\text{m}$ . Due to the adhesive and coagulative effect of the water drops even smaller droplets are removed. Thus the highest technically possible quality of high purity steam can be achieved. When using a heating steam of 8 bar, a high purity steam of 6 bar is achieved. If the required pressure of the high purity steam is lower, the productive capacity of the installation is increased. By using an electro-pneumatic control valve the high purity steam can be controlled within a range of 0 to 7.8 bar

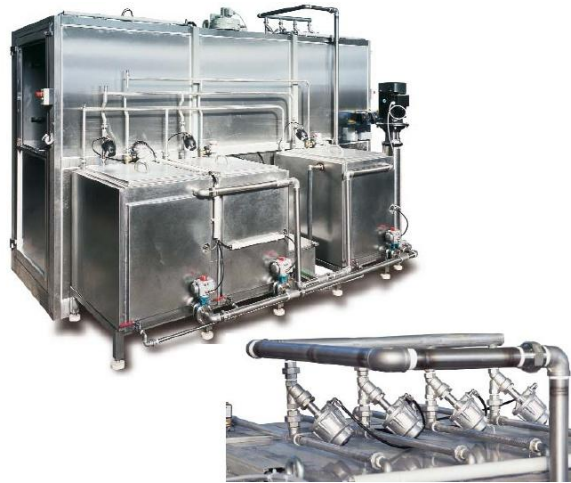
gauge pressure, corresponding to 100 to 178°C. The feed water used is deionized water. The materials used are nickel chromium molybdenum steel and PTFE.







# Applications: Life science



## Application

As well as sterile operation instruments, hospitals and medical facilities need a whole host of hygienic aids and containers. For this purpose, the soiled / contaminated items are sorted in transport cars and driven into the washing/aseptic machine. During the first phase, they are pre-washed using specially treated water at a temperature of 55° C. The second phase at the same temperature is the main wash. A cleaning additive is added to the DI-water. Following this, the third phase is the rinsing process at 85 – 90°C. Here, too, treated water with a sterilisation additive is used. Following this process, the devices are sterile/hygienic and ready for further use. The transport car can then be driven out of the other side of the machine.

## Plant design

The 4-metre long cleaning sluice offers space for two 1.5 m long transport cars so that they can run through the three cleaning phases one after another. The respective cleaning agent store for the three phases is located in the tanks attached to the side. The tanks' filling levels are monitored, feeding is made using a central low-pressure filling system which is controlled by butterfly valves. Water input to the respective sluice sections is made under increased pressure and using nozzle distribution: a pump provides the respective performance for this purpose, globe valves control the nozzles. The cars are automatically moved using a transport system. Globe valves are also used to control the tank heating.





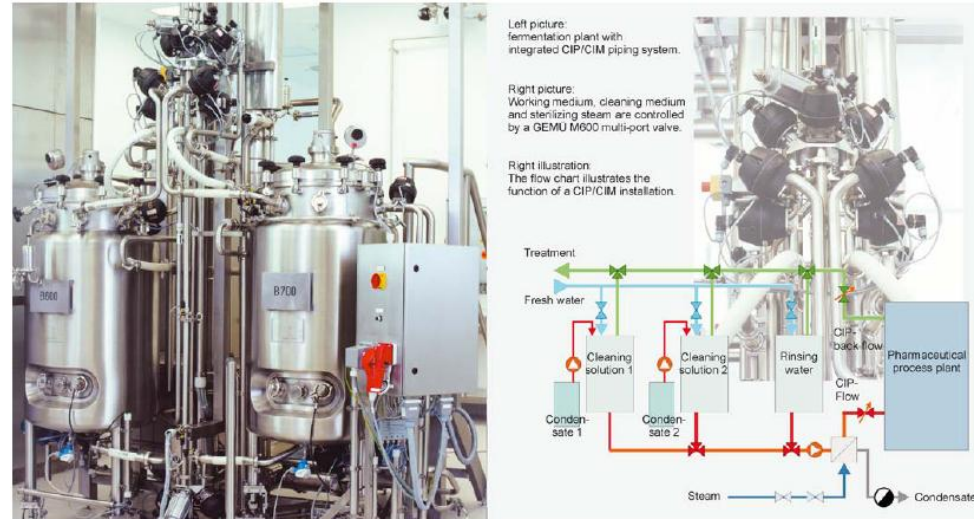
# Applications: Pharmaceutical

## Application

In pharmaceutical aseptic production the equipment must be easily cleanable and sterilizable. The product, the cleaning and rinsing medium as well as the steam condensate must also be able to be completely removed from the application. The unobstructed draining of the piping system without leaving residue is called 'self-draining'. The use of computer control systems or SPS control ensures that both the production process and the cleaning process are optimized and that there is absolutely no possibility of both processes interfering with each other. This is achieved by an advanced monitoring and sensor system.

## Plant design

The required cleanability and sterilizability of the equipment must be taken into consideration when designing the installation. The components and piping system must be arranged and assembled so that their internal contours are compatible. Often plant layout can lead to unusual piping arrangements and mounting positions. The problem is often increased by the fact that there is not enough space for an ideal layout of the components because in addition to the pipes and components conveying the product there are also pipes and control systems for the rinsing and cleaning agents as well as for sterile steam and condensate.



## Legende:

### CIP (Cleaning in Place):

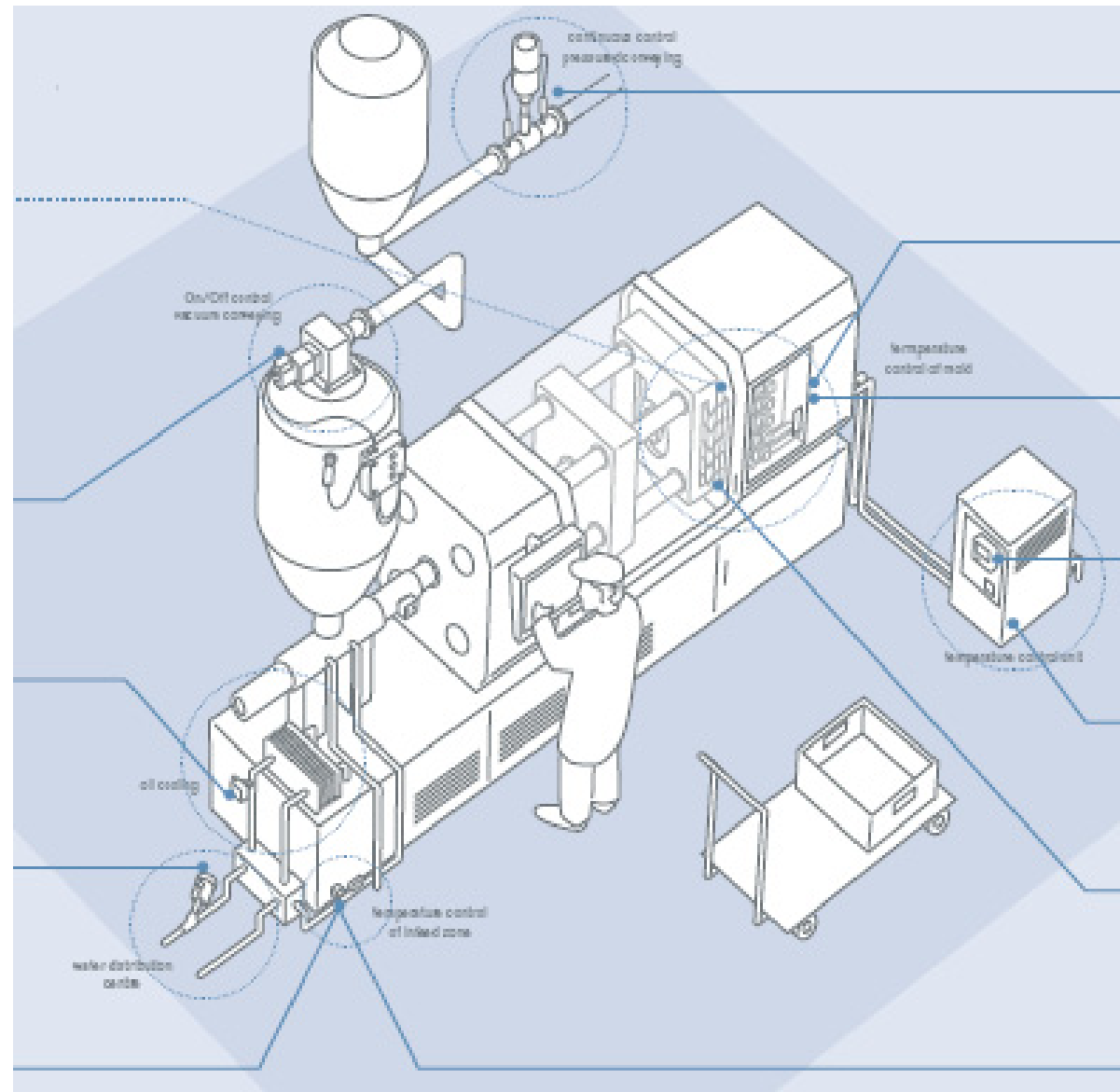
Is the internal cleaning of an installation without dismantling or making major changes to it.

CIM (Computer integrated manufacturing): Is the control and monitoring of several processes of an installation by computer or SPS.





# Applications: Moulding machine







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**ODE thanks...**

**for the attention**



solenoid valves

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