APV
AN SPX BRAND

Beverage Processing Solutions

SPX®

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APV – to help you get your products to market faster

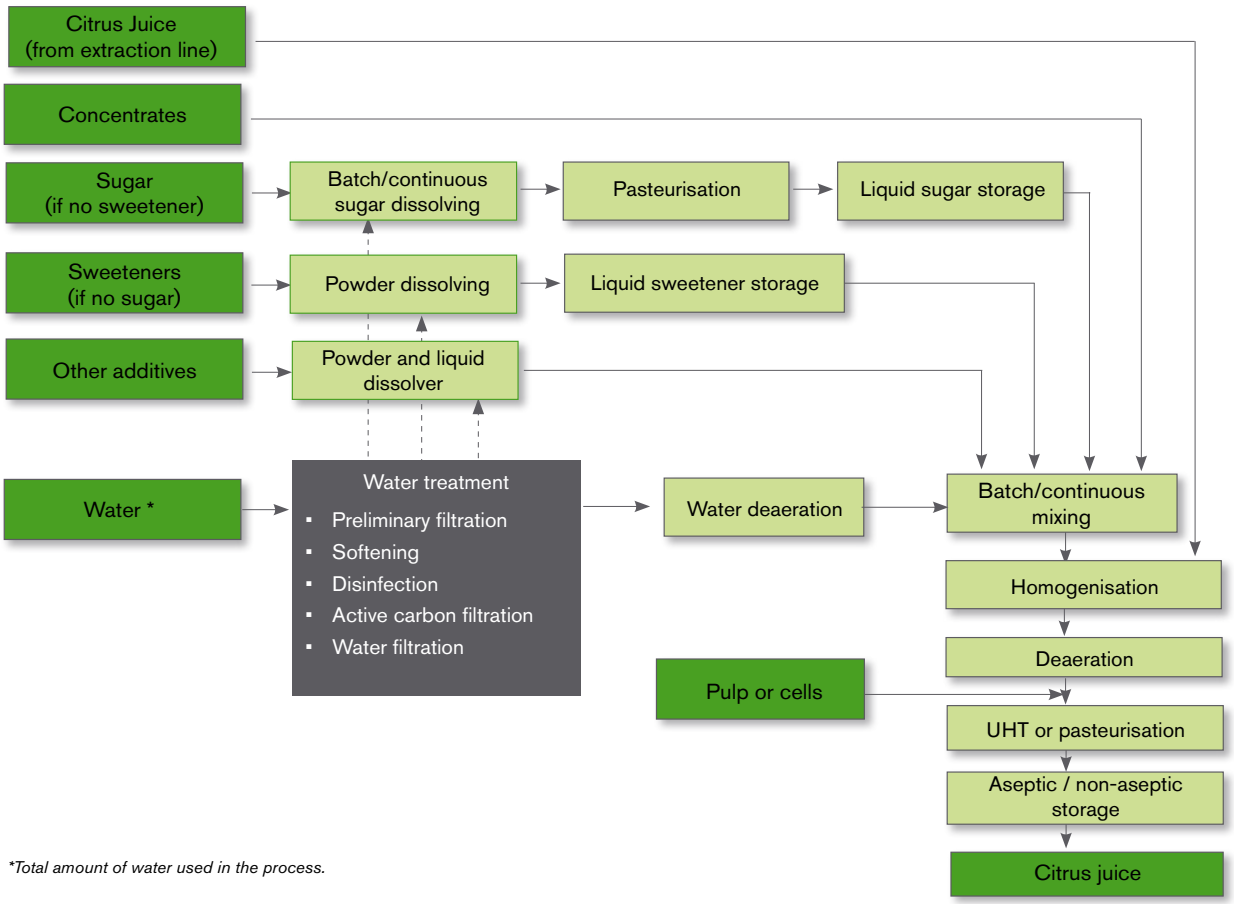
With APV process units we provide easier, faster, safer and more flexible solutions for your process plant.

All APV process units have been developed to meet top performance criteria. Each one reflects APV's process know-how and experience in both engineering and automation.

Although they are standardised to ensure product consistency wherever they are installed, all APV process units can be customised to meet local regulations. Pre-assembled, pre-wired and pre-tested, they are ready for production to help you get your products to market faster.

Extensive wet and dry tests are carried out at APV's well equipped factories, which are certified to ISO 9001 standards. At this stage, the control system is integrated with the mechanical components, resulting in reduced installation and commissioning costs.

The block diagram below shows the position of APV units and systems in a citrus juice processing line. The light green blocks show the fields for which complete solutions can be offered depending on the specific product requirements.



*Total amount of water used in the process.

A complete product range

APV process units comprise of a series of building blocks for each process stage within the syrup room. They include:

- CSD - Continuous sugar dissolving
- BlendMaster - Multi component blending
- BlendMaster - Two component blending
- APV Homogenisers - Homogenisation
- CarboMaster - Carbonation
- APV Pasteuriser - Pasteurisation
- Derox - Water deaeration
- Derox VFJ - Product deaeration
- Evaporation
- CIP Master
- Control Systems

Focused on adding value to your product

Our process units are designed to exceed industry standards and enhance the value of your products. To highlight how value is added to your products and processes, we have developed the following symbols for your reference.

Product uniformity
– homogenous products

Flexible production
– fast product change over

Economical production
– cost saving processes

Proven security
– tested equipment

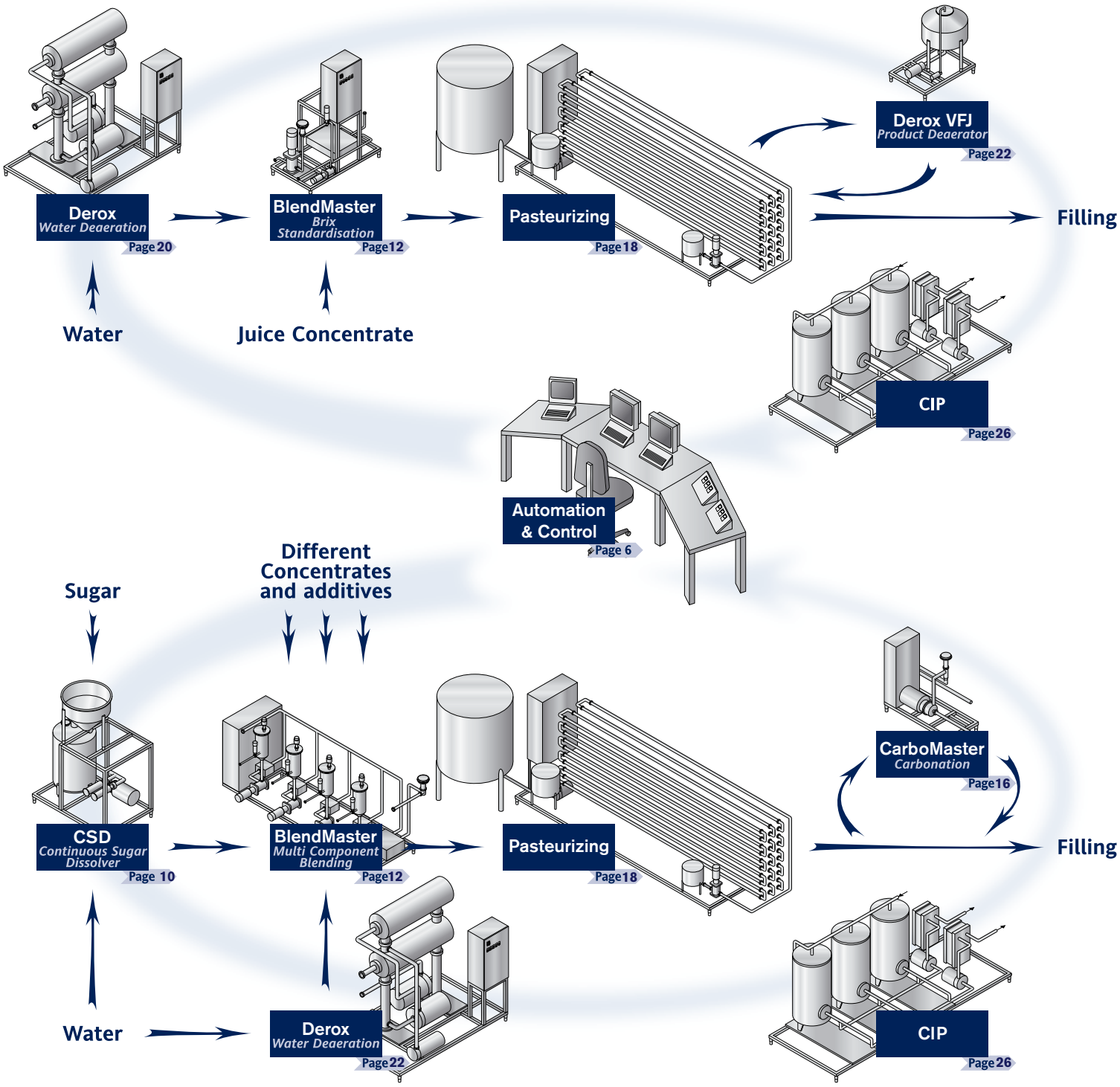
From individual units to automated solutions

Every unit can be supplied as a stand-alone system, ideally equipped for smooth and trouble free operation and suitable for integration into your central control system. However you will gain the maximum benefit when you purchase a combination of units, which have been specifically designed to operate together for optimum performance, both from a mechanical and a control perspective.

We can guarantee you a complete process solution tailored to your needs.

Fully Confidential Test Centres

APV offers fully confidential test centres where our customers are able to carry out laboratory and full-scale experiments, with expert technical advice on-hand at the customer's request. The facilities help our customers to feel secure in the knowledge that the process equipment supplied meets their expectations.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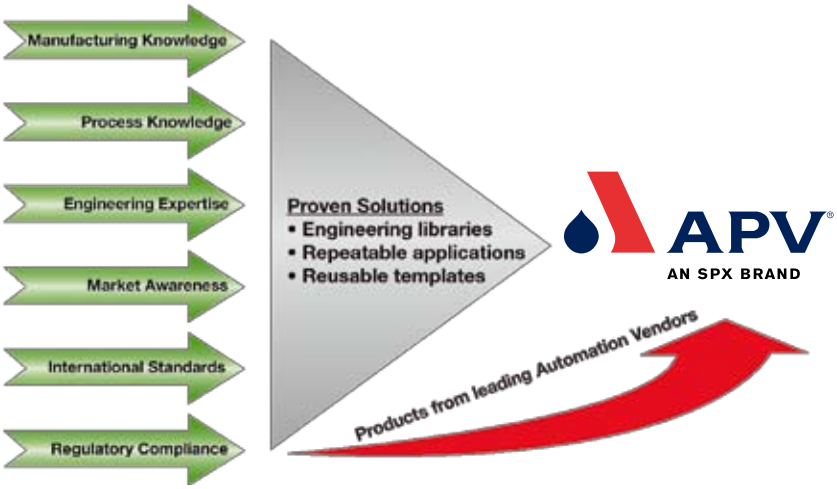
Automation and Performance Services Solutions

APV Automation and Performance Services combines innovative solutions with reusable engineering applications on open platforms to meet our customer automation specifications.

We offer state-of-the-art automation solutions and services designed to international standards based on in-depth process knowledge together with manufacturing know-how and engineering expertise that meet regulatory requirements. This enables customers to extend their performance gains across their business.

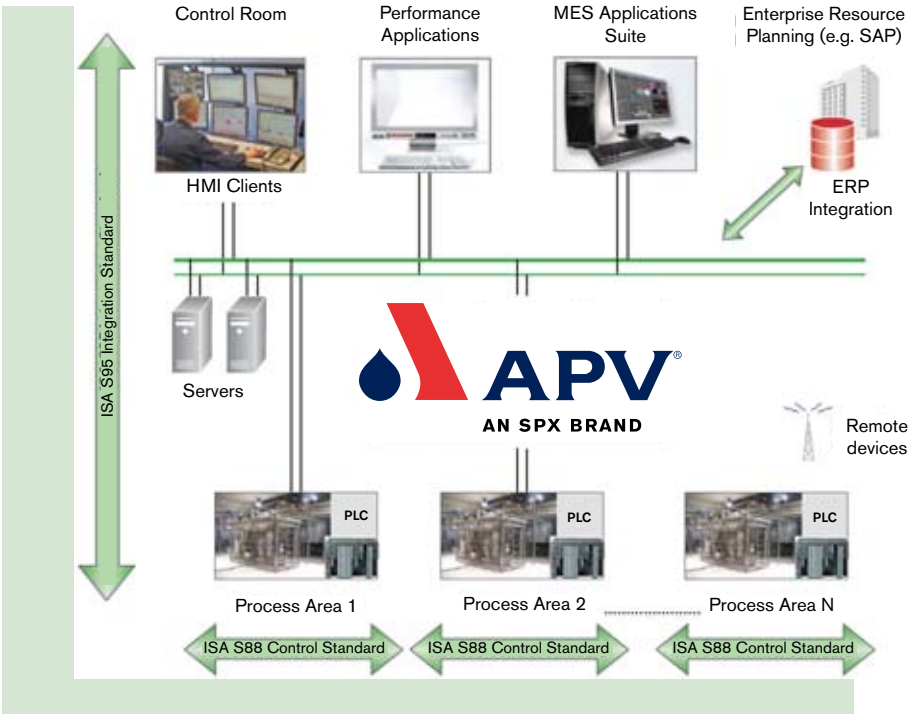


Value Streams

APV Automation and Performance Services comprise five strategic value streams to meet our customers' automation and manufacturing execution needs.

Automation Service for customers' existing automation equipment. Offering maintenance and support programmes, spare parts, etc. in order to maintain and improve conditions to maximize plant uptime

APV Automation and Performance Services is vendor independent, it can include, for example control systems and human machine interfaces (HMIs) from Siemens, Rockwell, Mitsubishi, Wonderware, etc. This enables true versatility in our solutions.

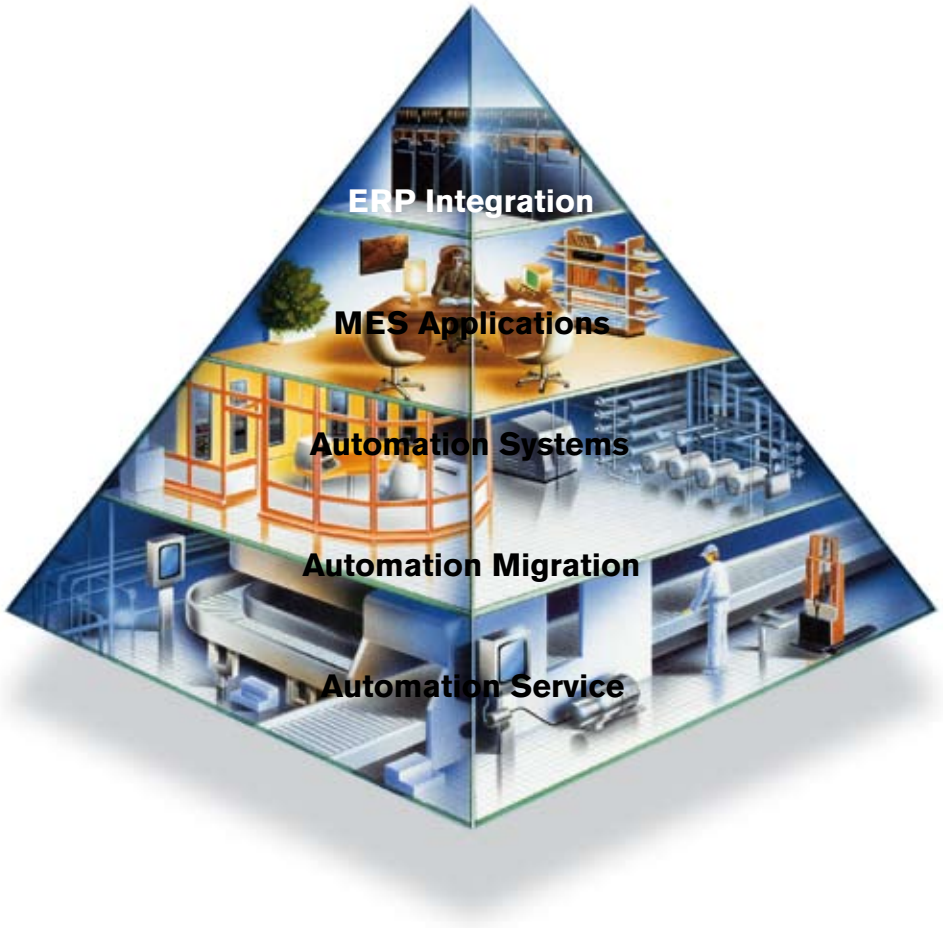


Automation Migration for our customers with an installed base of ageing and obsolete automation equipment, which can no longer adequately support their business. Furthermore, Automation Upgrade for systems that require additional functionality to meet automation and control requirements

Automation Systems consisting of PLC and HMI as part of our project offering. These can be in the form of a single skid unit to plant wide automation solutions

MES Applications targeting manufacturing and equipment performance, production execution, quality and tracking. We offer a suite of engineered applications designed to deliver the right information, at the right time, to the right people, in the right context to drive future actions in our customers' organisations to drive manufacturing excellence.

ERP Integration solutions that link and integrate the plant floor automation systems to our customer's enterprise or business layer



Maintenance Services

APV recognizes that cost-effective performance of your APV equipment is directly dependent on the ability to design and implement a cost-effective maintenance program.

In response to these requirements, and as part of the on-going expansion of our customer support strategy, APV Maintenance Services adapt to your specific requirements.

Maintenance Services consist of multiple levels of service agreements in order to create the ideal balance of flexibility, improved productivity, increased up-time and better financial performance of all APV equipment.

Different service agreements can be created for our customers. For example:

- **Basic Care**
  - APV service when you can plan ahead
  - Balance of uptime and economics for non-critical assets
- **Classic Care**
  - Comprehensive APV service support
  - When service delays are not an option
- **Advantage Care**
  - APV service coverage for your most critical equipment
  - Proactive approach to equipment performance
- **Total Care**
  - APV service management and support for the entire plant
  - Plant-wide strategy to improve mission effectiveness

Each agreement includes certain critical items, with each level providing progressively increasing support capability (see table below).

APV is committed to providing proactive service solutions. These Maintenance Service agreements provide the best possible service to maximize your performance and deliver improved return on your investment.

A Systematic Program of Strategic Maintenance

APV service management and support for the entire plant *Plant-wide strategy to improve mission effectiveness*	*APV service coverage for your most critical equipment* *Proactive approach to equipment performance*	*Comprehensive APV service support* *When service delays are not an option*	*APV service when you can plan ahead* *Balance of uptime and economics for non-critical assets*
Total Care	***Advantage Care***	***Classic Care***	***Basic Care***
Agreement of delivery of critical spare parts	Agreement of delivery of critical spare parts	Agreement of delivery of critical spare parts	Agreement of delivery of critical spare parts
Agreement of emergency service support	Agreement of emergency service support	Agreement of emergency service support	Agreement of emergency service support
APV Preventive Maintenance program, 24/7/365	APV Preventive Maintenance program, 24/7/365	APV Preventive Maintenance program, Monday to Friday 8am-5pm	One annual planned maintenance visit
Free emergency service, 24/7/365	Emergency service, 24/7/365	Emergency service, Monday-Friday, 8am-5pm	Spare parts discount
Wear parts and service parts included	Wear parts and service parts included	Wear parts included	Recommended wear parts replacement scheme
Other spare parts discount	Other spare parts discount	Other spare parts discount	Technical telephone support, Monday-Friday, 8am-5pm
Technical telephone support, 24/7/365	Technical telephone support, 24/7/365	Technical telephone support, Monday-Friday, 8am-5pm	
Modem support included	Modem support included	Modem support - optional	
Strategy for service partnership seminar	Strategy for service partnership seminar	Strategy for service partnership seminar	
Software upgrades	Predictive maintenance on critical items		
Plant availability guarantee	Software upgrades		
Designated APV maintenance manager	Rebuilding and retrofitting consultancy		
Continuous process cost reduction			
Guaranteed performance guarantees on critical items			
Annual process knowledge analysis			
Rebuilding and retrofitting consultancy			
Operator audit and training discount			

APV Homogeniser

Effective disruption of particles ensures excellent stability, viscosity, mouth feel, and yield of your beverage products.

APV features a wide selection of laboratory, pilot plant and production homogenisers. Gaulin and Rannie are famous names in the history of homogenisation. With over a century of real-world experience we have the homogenisers and the experts to ensure an ideal configuration and installation for various beverage products.

Rannie and Gaulin homogenisers – adds value

When you install a Rannie or a Gaulin homogeniser in your process lines you add value to your products and production.

Product uniformity

- A narrow particle size distribution is created giving rise to excellent flavouring, viscosity, mouth feel and stability properties in the actual beverage

Economical production

- High homogenising efficiency
- Long lifetime of homogenising valves and other parts
- Reduced maintenance and downtime
- Oil and water consumption are slashed

Flexible production

- Pressure and capacity can be varied independently
- Capacities up to 60000 l/h and pressures up to 1500 bar (2000 bar in lab-scale)
- Cleaning and sterilisation are simplified thanks to an in-line design that virtually eliminates crevices and dead ends.

Proven security

- Every unit leaving the APV workshop is fully tested
- Proven functionality and reduced commissioning time
- Noise and vibration are reduced dramatically

The liquid end of the APV homogenisers offers precise operation while meeting all sanitary specifications. APV offers a wide range of materials and configurations.

Products

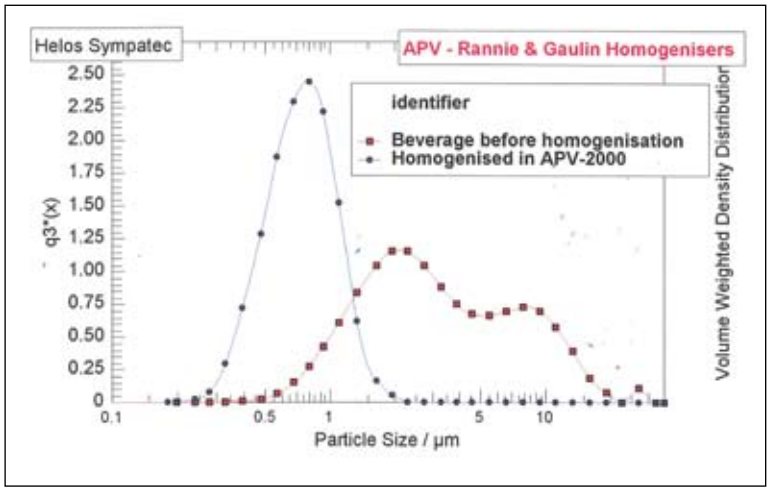
- Flavour emulsions, flavour concentrates and clouding agents
- Cream Liqueurs
- Various fruit nectars / fruit juices

Functional description

The high pressure homogeniser is basically a positive pump equipped with a narrow slit called the homogenising valve. The beverage is forced through the homogenising valve at high pressure followed by a very high speed and this process causes disruption of oil droplets and other particles in the liquid.

Options

- Aseptic homogenisers are available for down stream homogenisation processes
- Variable pressure and capacity
- Various homogenising valves like the SEO, XFD, LW or patented MicroGap™ for best homogenising efficiency
- Various materials for long lifetime
- Product testing in our homogeniser application laboratory (laboratory scale) or in our Innovation Centre (pilot scale)
- Customer specific configuration



Tomato *Lycopersicon lycopersicum*

CSD – Continuous Sugar Dissolver

The Continuous Sugar Dissolver gives you optimal flexibility and offers great cost saving potential

The CSD is a fully automatic sugar syrup blending system, which can readily be integrated with any of the APV beverage process units.
When designing the CSD, great emphasis has been placed on the production of a flexible unit with a wide capacity range and high accuracy of the final Brix value.

The APV CSD is capable of producing sugar syrup up to 72° Brix.
The combination of using only high quality instruments with specially developed control software gives a Brix value accuracy in the sugar syrup of ± 0.1°Brix.*

The standard capacity range spans 5,000 to 50,000 l/h.

APV Continuous Sugar Dissolver – adds value

When you install the APV CSD in your process line, you add value to your products and production.

Product uniformity

- An accuracy of ± 0.1° Brix in the final product.
- Blending control takes place via Brix analyses done by an inline mass flow meter placed in the ready mixed product line.
- The jet mix principle is used for optimum dissolving in the dissolver tank.
- The CSD system will give a more precise and consistent product, resulting in savings in raw ingredient consumption as well as satisfied customers.

Lime *Citrus Aurantiifolia*

Economical production

- The CSD is fully automatic, which results in a reduction in manpower requirements.
- The CSD is designed for fast settling time. When starting up the unit with an empty tank the settling time is 20 minutes in order to reach a steady state at, for example, 60° Brix.
- The high accuracy level means that analysis of the syrup in a buffer tank is unnecessary. The product can go directly to the pasteurizer or to another process.
- The CSD is designed for low maintenance and energy costs.

Flexible production

- A flexible unit with a capacity turn down ratio of up to 1/5 of the final product.
- The very compact design minimises the space required. As large batch mixing tanks are eliminated, additional space will be saved.
- The APV CSD is skid mounted, which allows easy relocation in the event of production restructuring.

Proven security

- Every unit leaving the APV workshop is fully tested.
- Proven functionality and reduced commissioning time.

Functional description

The sugar dissolving in the APV CSD is performed by means of a jet mix recirculation of either water or low Brix syrup from a recovery tank together with sugar in the dissolving tank. In this way optimum sugar dissolving and utilisation is achieved.

Built-in filters in the system trap any non-dissolved sugar crystals and return them to the dissolver tank.
The dry sugar is metered into the sugar

dissolving system via a screw feeder. The motor for the conveyor is equipped with a frequency converter for capacity regulation.

The speed of the dry sugar conveyer is adjusted during the commissioning and is then kept constant.

High performance and highly accurate mass flow meters are the key to the strength of the final syrup. A built-in temperature transmitter compensates for temperature variations of the syrup ensuring that the right Brix value is temperature independent.

The final syrup Brix value is continuously monitored and adjusted as necessary. If the Brix value is out of range, the outlet valve of the CSD is closed and the syrup is returned to the dissolving tank. This circulation continues until the Brix value is again within range. This control philosophy ensures the correct Brix value and avoids starting and stopping the unit.

This control principle ensures a fast and reliable Brix control. It also ensures that a Brix equilibrium of the CSD system can be obtained in 20 minutes starting from a completely empty dissolver tank. The accuracy obtained is ± 0.1° Brix in the final product.

If the APV CSD feeds a balance tank, the capacity of the CSD will be adjusted according to the level in the balance tank.

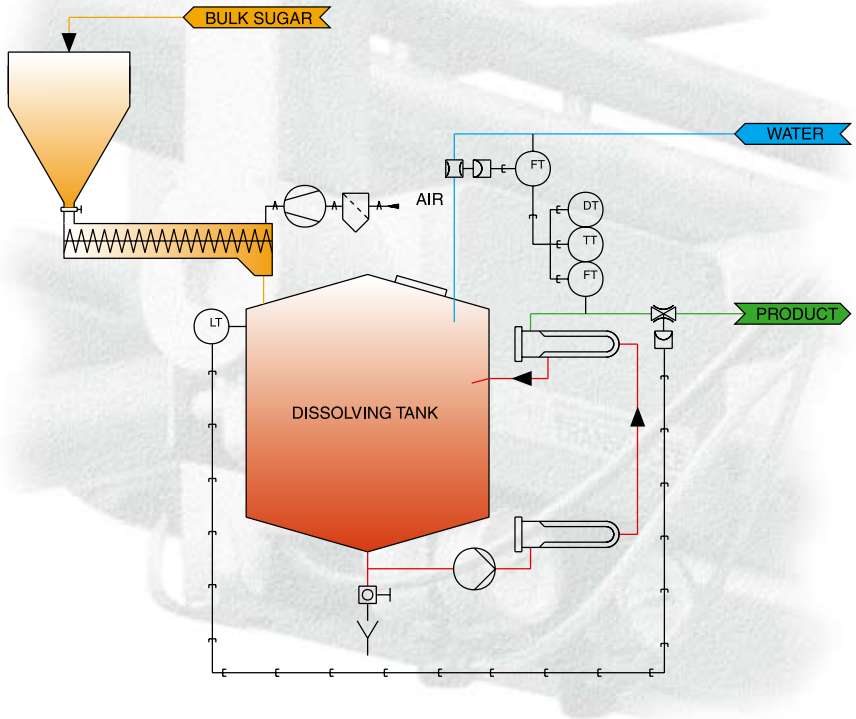
All signal exchanges are digital, which improves precision and gives more possibilities for data transfer to the control room than traditional analogue (4-20 mA) signal exchange.

The standard APV control consists of a controller with an operator panel. The signal exchange between the instruments/controller/control room is performed using a bus system. The operator panel contains the following features:

- Totalization of the sugar syrup over time.
- Storage of 15 alarms based on the first in/first out principle.
- Status of alarms.

Options

- Extended capacity turndown ratio.
- Cold, warm or hot dissolving depending on the required syrup Brix value.
- Total solution, complete with sugar hopper and screw conveyer.
- De-coloration of sugar syrup with active carbon.
- Fine mesh filters.
- 3A design.
- Product testing in our Customer Test Centre.
- Customer specific equipment/ instrumentation.

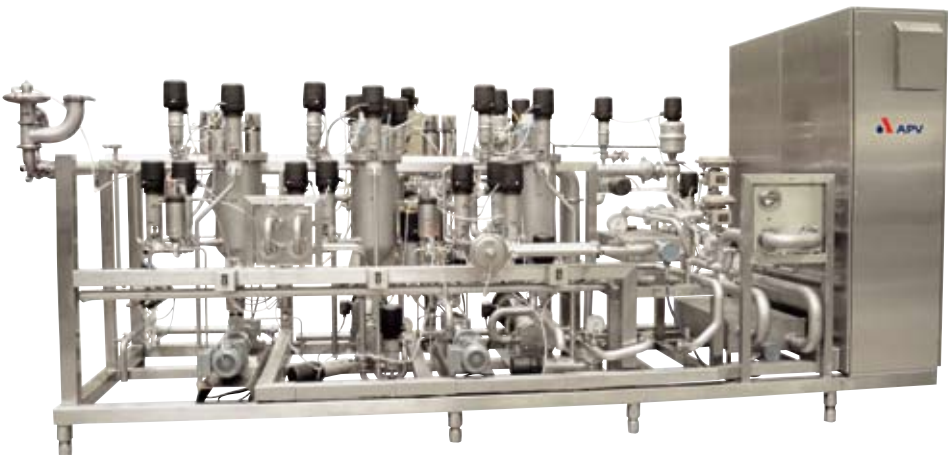


BlendMaster – Intelligent Multi Component Blender

The BlendMaster adds new dimensions to accurate standardising and efficiency

The BlendMaster is a fully automatic, continuous blending system, which can readily be integrated with any of the APV beverage process units. The standard BlendMaster can store and handle up to 30 different recipes. When designing the BlendMaster great emphasis has been placed on the production of a unit to give optimum product yields and flexibility. Special attention has been given to the selection of valves and a short pipe layout. Nitrogen back flush of concentrates to the source vessel further improves the product yield. The use of only high quality instruments combined with specially developed control software gives a dosing accuracy of each of the individual components of ± 0.1%.*

The standard capacity range spans 5,000 to 55,000 l/h.



BlendMaster – adds value

When you install a BlendMaster in your process line, you add value to your products and production.

Product uniformity

- An accuracy of ± 0.1% by weight of total ingredient mass.*
  (For normal juices this corresponds to a Brix accuracy of ± 0.05° Brix)
- A continuous blending system gives a more precise and consistent product. This results in savings of raw ingredients as well as satisfied customers.

Economical production

- The BlendMaster is fully automatic, reducing manpower requirements.
- The inline dosing and high accuracy level means that buffer tank analyses are no longer necessary.
- The product can go directly to the pasteuriser and on to the filler.
- Due to extended recipe handling, production errors are eliminated.
- Raw material savings and "just in time" production can be achieved.
- The BlendMaster is designed for extremely fast response when starting up after a shut down. The settling time is less than 10 seconds.
- The use of nitrogen back-flush combined with a compact design reducing the pipe volume, means raw product waste will be minimised.
- Low maintenance and energy costs.

Flexible production

- The unit is flexible with a high turn down ratio.
- The BlendMaster is capable of making a product change in as little as 5 minutes depending on the requirement for a partial or full product change including CIP.
- The very compact design minimises the space required. As large batch mixing tanks are eliminated, additional space will be saved.
- The BlendMaster is skid mounted, which allows easy relocation in the event of production restructuring.

Proven security

- Every unit leaving the APV workshop is fully tested.
- Proven functionality and reduced commissioning time.

Products

- All kinds of juice beverages with fibres up to 12 mm long.
- Diet beverage products.
- Soft drinks.
- Carbonated soft drinks.
- Premix of syrups.
- Flavoured dairy beverages.
- Tea beverages.
- Alcohol based beverages.

Pineapple *Ananas Comosus*

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Functional description

The principle of the BlendMaster dosing is proportional blending by mass. Dosing is performed according to the recipe keyed into the software of the control system.

High performance and highly accurate mass flow meters are used to meter each ingredient. A built-in temperature transmitter compensates for temperature variations of the ingredient ensuring correct dosing, irrespective of temperature. Thirty recipes are available with the standard program.

To meet the natural variation of Brix values in fruit concentrate, the lines for concentrate and sugar syrup are made capable of compensating for varying Brix levels, while still maintaining the specification of the final product.

The program is designed with a “valve position learning” feature. This makes it possible for the BlendMaster to reach steady operation in a shorter time during capacity changes. Furthermore the program “remembers” the position/speed of pumps, valves and instruments when the BlendMaster stops. When the BlendMaster restarts the system returns to the state prior to the stop. This enables a settling time to be achieved in less than 10 seconds after a restart.

Each of the raw ingredients is dosed into a small balance tank equipped with a level transmitter at the inlet to the BlendMaster. A pump placed after the balance tank extracts the ingredient and leads it to the dosing point. The purpose of the balance tank is to allow the flow and pressure of the ingredient to be under total control.

At the dosing point all the ingredients are introduced in counter flow to the water stream. To ensure a fully blended product without stratification a static mixing module is installed at the end of the blending line.

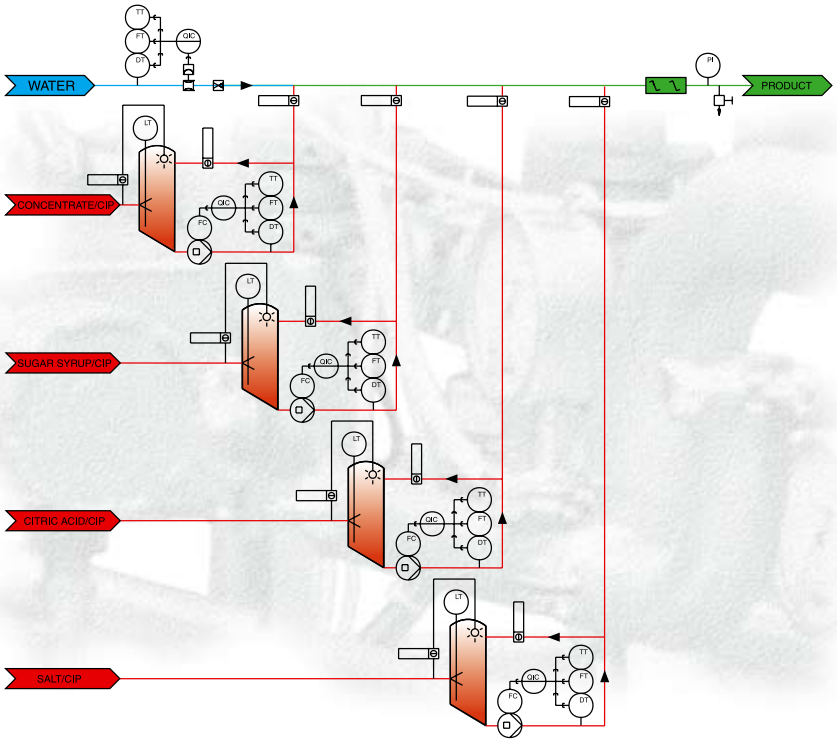
The design of the BlendMaster minimises the effect of entrained air in the product.

The standard APV control consists of a controller with an operator panel. The signal exchange between the instruments/controller/control room is performed using a bus system.
The operator panel contains the following features:

- Totalization of each individual ingredient over time.
- Totalization of final product over time.
- Storage of 15 alarms based on the first in/first out principle.
- Status of alarms.

Options

- Extended capacity turndown ratio.
- Compensation for varying concentrate and sugar syrup Brix values.
- Adding additional ingredients and recipes.
- Mounting a refractometer in the final product line for monitoring of the final Brix value.
- 3A design.
- Product testing in our Customer Test Centre.
- Customer specific equipment.



BlendMaster
- extended with Brix Standardisation

The BlendMaster is a fully automatic two-stream or multistream blending system, which can readily be integrated with any of the APV beverage process units. The standard BlendMaster can store and handle up to thirty different recipes.
When designing the BlendMaster great emphasis has been placed on a unit, which can operate with many different products without compromising accuracy. The BlendMaster performance is independent of product temperature variations and the presence of fibres in the product. The BlendMaster can even operate with diet products. The basic two-stream BlendMaster can easily be turned into a multistream BlendMaster, thereby adding to the versatility of the unit (see page 14).
The use of only high quality instruments with specially developed control software gives an accuracy of ± 0.05° Brix in the final product.*

The standard capacity range spans 5,000 to 30,000 l/h.

BrixMaster – adds value

When you install a BlendMaster in your process line, you add value to your products and production.

Product uniformity

- An accuracy of ± 0.05° Brix in the final product.*
- The blending control is based on Brix analyses from data provided by an in-line mass flow meter placed in the ready mixed product line.
- The continuous blending system gives a precise and consistent product. This will result in savings in raw ingredient consumption as well as satisfied customers.

Economical production

- Product loss is eliminated by leading recovered off-Blend product back to the BlendMaster.
- The BlendMaster is fully automatic, reducing manpower requirements.
- The BrixMaster is designed for extremely fast response when starting up after a shut down. The settling time is less than 10 seconds.
- The inline dosing and high levels of accuracy mean that buffer tank analyses are no longer necessary. The product can go directly to the pasteuriser and on to the filler.
- Due to extended recipe handling, production errors are eliminated.
- Raw material savings and "Just In Time" production can be achieved.
- Low maintenance and energy costs.

Flexible production

- A flexible unit with a capacity turn down ratio of up to 1/6 of the final product.
- The BlendMaster is capable of making a product change in as little as 5 minutes depending on the requirement for a partial or full product change including CIP.
- Simple modification from a two-stream blender into a multistream blender.
- The very compact design minimises the space required. As large batch mixing tanks are eliminated, additional space will be saved.
- The BrixMaster is skid mounted which allows easy relocation in the event of production restructuring.

Proven security

- Every unit leaving the APV workshop is fully tested.
- Proven functionality and reduced commissioning time.

Pear *Pyrus Communis*

Products

- All kind of juice beverages with fibres up to 12 mm long.
- Diet beverage products.
- Alcohol based beverages.

Functional description

BlendMaster blending is based on direct inline Brix measurement of the final product. The desired final product data are keyed into the control system and the software handles the dosing of water and raw product.

High performance and highly accurate mass flow meters are used to meter each ingredient. A built-in temperature transmitter compensates for temperature variations of the ingredient, ensuring correct dosing, irrespective of temperature. The standard BlendMaster can store and handle up to thirty different recipes.
The program is designed with a “valve position learning” feature. This makes it possible for the BlendMaster to reach steady operation in a shorter time during capacity changes. Furthermore the program “remembers” the position/speed of pumps, valves and instruments when the BlendMaster stops. When the BlendMaster restarts the system returns to the state prior to the stop. This enables a settling time to be achieved in less than 10 seconds after a restart.
The dosing pump for the concentrate is a positive pump.
Capacity regulation is obtained by controlling the frequency of the pump motor. The capacity regulation of water is done by controlling a regulating valve installed at the dosing point.

At the dosing point the water is introduced in counter flow to the concentrate stream. To ensure a fully blended product without stratification, a static mixing module is installed in the end of the blending line.
The design of the BlendMaster minimises the effect of entrained air in the product.

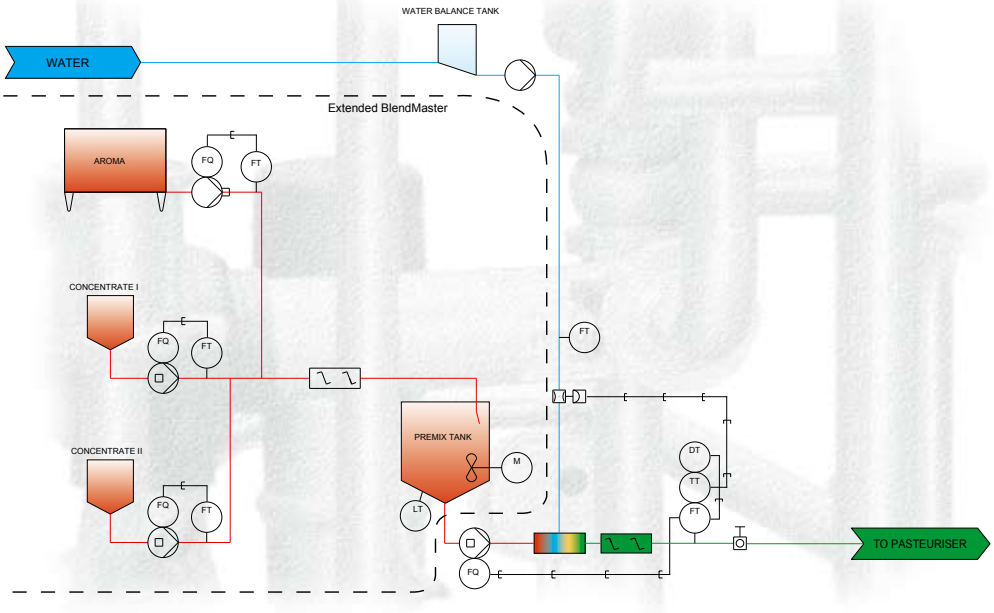
The standard APV control consists of a controller with an operator panel.
The signal exchange between the instruments/controller/control room is performed using a bus system.

The operator panel contains the following features:

- Totalization of the concentrate over time.
- Totalization of the final product over time.
- Storage of 15 alarms based on the first in/first out principle.
- Status of alarms.

Options

- Extended capacity turn down ratio.
- Addition of a third line.
- Addition of further recipes.
- 3A design.
- Product testing in our Customer Test Centre.
- Customer specific equipment.



CarboMaster – Carbonation

The CarboMaster is the answer when you are looking for a cost effective, accurate and flexible CO_2 dosing unit

The heart of the CarboMaster unit is the patented CO_2 Injector. This injector injects liquid into the gas in preference to the traditional method of injecting gas into liquid. This achieves faster dissolution and the CO_2 is tightly bound to the beverage.
The requirement for long pipe runs, low temperatures and high pressures is significantly reduced. Furthermore the injector can be cleaned using standard CIP procedures as an integral part of the cycle.
The rate of CO_2 addition can be monitored with a CO_2 measuring instrument. This can be used to control the dosing set-point, but the accuracy of the system is improved by the use of mass flow measurement for the gas. This gives a level of accuracy, which is better than the measuring instrument, typically ± 0.1 g/kg CO_2 in the beverage.*

The standard capacity range spans 5,000 to 70,000 l/h.

CarboMaster – adds value

When you install a CarboMaster in your process line, you add value to your products and production.

Product uniformity

- An accuracy of ± 0.1 g/kg CO_2 in the beverage.* The use of mass flow measurement further improves accuracy.

Economical production

- As the total amount of CO_2 is tightly bound to the beverage, the utilisation of CO_2 is 100%.
- Fully automatic version available resulting in reduced manpower.
- Low maintenance costs and efficient operation.

Flexible production

- The capacity of the unit is normally variable within 10% for fixed injector units and down to 25% of nominal capacity for variable injector units.
- Carbonation levels up to 10 g/kg CO_2 can be obtained.
- The system can be optimised for different CO_2 levels at different temperatures and pressures.
- Full CIP capability.
- Compact design minimises space requirements and pipe runs.
- The CarboMaster is skid mounted which allows easy relocation in the event of production restructuring.

Proven security

- Every unit leaving the APV workshop is fully tested.
- Proven functionality and reduced commissioning time.

Products

- All types of beverage.

Functional description

The CarboMaster is available in three basic versions:

- A fixed injector unit for manual adjustment with a variation in capacity of 10% of the nominal capacity.
- An automatic version with a CO_2 measuring instrument and fixed injector with a variation of 10% of the nominal capacity.
- An automatic version with a CO_2 measuring instrument and variable injector with a capacity down to 25% of nominal capacity.

Common to all versions is a booster pump, which achieves the required carbonation pressure. This pressure is maintained to the system outlet with a backpressure valve.

The manual fixed injector unit is sized according to the beverage flow and the CO_2 level required. The actual

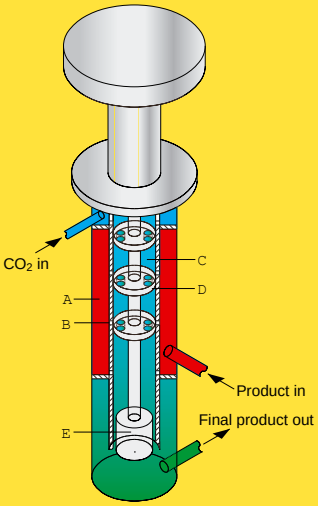
Lemon *Citrus Limon*

The APV patented inline CO_2 injector allows a compact installation achieving fast gas dissolution in a limited space. The drawing to the right shows the principles of construction.

A Product Chamber
B Injection Holes
C Infusion Chamber
D Axially Arranged Disks
E Inline Mixer

The beverage is fed to the product chamber where it is injected into the infusion chamber via the injection holes. The gas is simultaneously dosed into the infusion chamber where it comes into turbulent contact with the beverage. This mixing is controlled over the length of the injector so that 50% of the beverage enters the first of four sections of the infusion chamber. The beverage becomes supersaturated with CO_2 and falls through the holes in the axial disks, which creates further turbulence, augmented by additional beverage entering the lower sections. The level of CO_2 falls to the specified value due to this beverage addition.
The axial disks are mounted on a central shaft. In the variable capacity version, moving this shaft with a pneumatic actuator causes the disks to open or mask the injection holes allowing the system to be trimmed in relation to the product flow, and ensuring an even distribution of beverage in the infusion chamber.

The inline mixer ensures that the product leaves the injector as a homogenous liquid without residual gas.



CO_2 level is set by means of a needle valve using a flow indicator.
The automatic version includes a CO_2 measuring instrument and modulating valve. The CO_2 injected is regulated from the CO_2 measurement in the beverage.

If a variable injector is fitted, the characteristics of the system are changed on a flow meter signal to fit the beverage flow, allowing much larger capacity variations down to 25% of the nominal capacity.

For high accuracy a mass flow meter can be fitted to the gas inlet, allowing ratio control blending to be used. This is a continuous system which overcomes the limitations of most measuring instruments that are capable of supplying a signal only 2 to 4 times per minute. The instrument is usually retained as an indication of the actual CO_2 level and can also be used for alarm purposes. Data on CO_2 usage can also be collected for further handling in Production Management Systems.

The CarboMaster traditionally feeds a buffer tank to compensate for changes in flow to the filling machine.

The flow is adjusted to meet this demand and keep a fixed level.

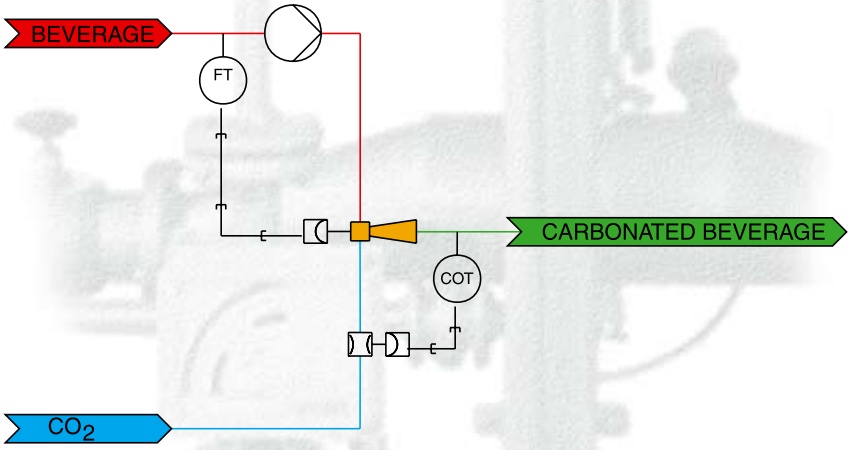
Digital instrumentation is also available, improving precision and allowing the possibility of direct feed to the filling machine.
The standard APV control consists of a controller with an operator panel. The signal exchange between the instruments/controller/control room is performed using a bus system.
The operator panel contains the following basic features:

- Totalization of the beverage over time.
- Storage of 15 alarms based on the first in/first out principle.
- Status of alarms.

Other features depend upon the options selected.

Options

- Three basic versions.
- Mass flow gas measurement.
- Pressurised buffer tank
- 3A design.
- Product testing in our Customer Test Centre.
- Customer specific equipment.



APV Pasteuriser

If you value gentle and accurate heat treatment you will also value the APV Pasteuriser

Most commercial liquid food products undergo some form of heat treatment. Pasteurisation is the most common form.

The APV pasteuriser has been designed for the most gentle heat treatment of the beverage and causes minimal thermal damage. The design of the unit puts emphasis on flexibility to meet the demands of the operator. The APV Pasteuriser is fully automatic and can be readily integrated with any of the APV beverage process units.
The use of only high quality instruments with specially developed control software gives a pasteurising temperature accuracy of ± 0.5°C.*

The standard capacity range spans 5,000 to 30,000 l/h.

APV Pasteuriser – adds value

When you install an APV Pasteuriser in your process line, you add value to your products and production.

Product Uniformity

- Control of pasteurising temperature to an accuracy of ± 0.5°C.*

Economical Production

- Long running time.
- Low maintenance and energy costs.
- Almost no product loss.

Flexible Production

- Capable of operating with many different products.
- Compact design minimises space requirements and pipe runs.
- The APV Pasteuriser is skid mounted which allows easy relocation in the event of production restructuring.

Proven security

- Every unit leaving the APV workshop is fully tested.
- Proven functionality and reduced commissioning time.
- Separate hot water circuit.

Products

- All types of single strength juice and juice concentrates with fibres of up to 12 mm long.
- All types of soft drinks.
- Sugar syrup.

Functional description

The design of the unit is tailored to the product type and the requirements of the filling machine. Several heat exchanger types are available including plate heat exchangers (PHE) and corrugated tube heat exchangers (CTHE).

For low viscosity beverages without fibres or particles, the PHE gives the best solution. It has a compact design which can include a high regenerative capacity to reduce energy requirements and improve production economy.

For a medium to high viscosity beverage with or without fibres or particles, a CTHE is normally chosen. Compared with a straight tube solution, the CTHE has a larger heat transfer surface. The corrugations also result in increased turbulence, which enhances heat transfer and avoids laminar flow in high viscosity products. The increase in heat transfer coefficient also leads to a reduction in the required surface area compared with straight tube heat exchangers.

Modern focus on the reduction of operating costs leads to the demand for long running times and the ability to maintain sterility during filler stops. The APV Pasteuriser fulfils both these demands.

If the filler stops, it is bypassed and the product returned to the pasteuriser balance tank, which has sufficient capacity for all the pasteuriser contents. It is normal to recirculate the product for a limited time and when this expires, the product is pushed into the balance tank with water, which is then recirculated

Grapefruit *Citrus Paradisi*

without entering the balance tank, to maintain the thermal balance. When filling recommences, product from the balance tank pushes this water to the drain. The interface between beverage and water is detected by means of a conductivity sensor and the control system signals the filler to start.

The operation is fully automatic. Over-pasteurised product and downtime for cleaning are thus both avoided.
The APV Pasteuriser gives guaranteed trouble free operation under every condition.

Temperature control is fully automatic and if a low pasteurisation temperature is detected, the valve to the filler is closed and the product is diverted back to the buffer tank.

Pasteurisation takes place under over-pressure when the required pasteurisation temperature approaches the product boiling point.

In order to avoid possible leakage from the service side to the product side of the pasteuriser, the product pressure is always higher than the water pressure.

The APV Pasteuriser is an integrated total solution.
The system includes:

- Centrifugal pumps, positive pumps or an appropriate combination to ensure optimal operation.
- CIP pumps.
- Valves and instrumentation to ensure a smooth, automatic operation.
- Complete hot water system including water heater, steam regulating valves, expansion vessel, pumps, and appropriate valves and instruments.

All signal exchanges are digital, which improves precision and gives more possibilities for data transfer to the control room than traditional analogue (4-20 mA) signal exchange.

The standard APV control consists of a controller with an operator panel.

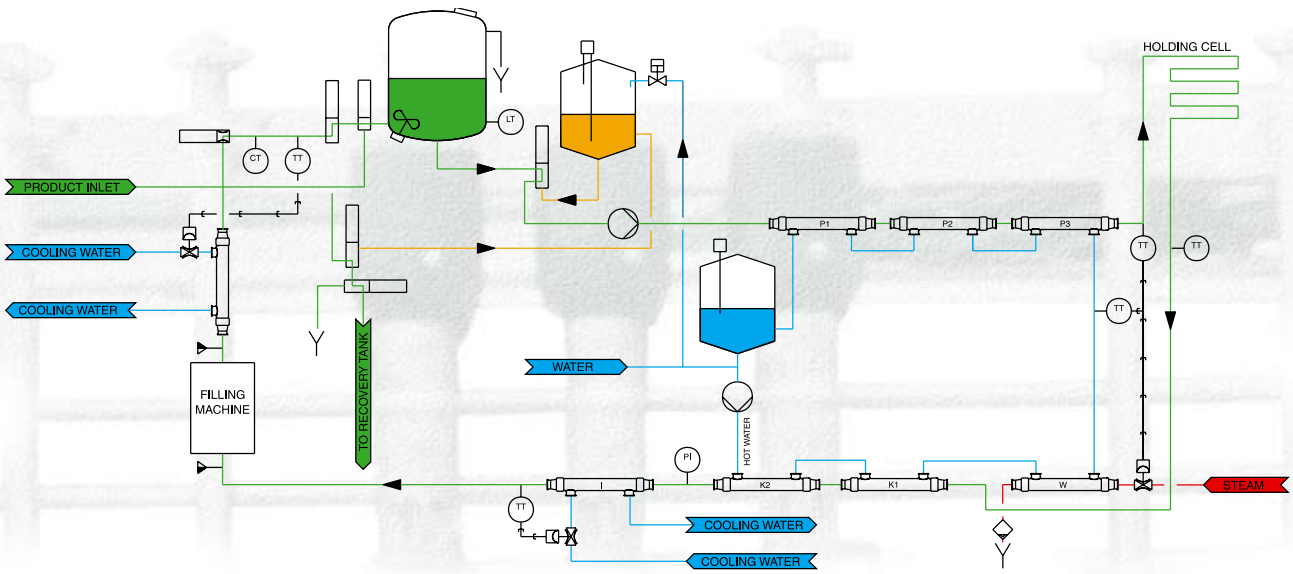
The signal exchange between the instruments/controller/control room is performed using a bus system.

The operator panel contains the following features:

- Temperature readings.
- Storage of 15 alarms based on the first in/first out principle.
- Status of alarms.

Options

- The APV Pasteuriser can interface with cold filling, hot filling and aseptic filling.
- The aseptic version is built as a fully aseptic process plant with pasteurisation, normal and sterile intermediate CIP, aseptic barriers and control software protection to ensure aseptic operation at all times
- PHE for heat exchanger choice.
- Variable capacity regulation.
- Automatic changeover valves in the holding tube with variable capacity.
- Homogeniser.
- Aseptic Tank.
- 3A design.
- Product testing in our Customer Test Centre.
- Customer specific equipment.



Derox – Water Deaerator

Improve your juice quality with the Derox Deaerator

Oxygen is vital for life on earth, fuelling processes in daily life such as the metabolism of food. It is a requirement for the existence of mankind.
However reactions with oxygen also cause degradation. One of these reactions which should be avoided is the degradation of vitamin C. 1 mg of oxygen reacts with 11 mg vitamin C.
If the dissolved oxygen in water is 9 mg/l, 1 l of water will destroy 99 mg of vitamin C!

Another negative effect is the oxidation of both orange and apple juices, giving a brown colouring.
For juice the normal acceptable O_2 content is 0.5 to 1.0 mg/l.

The APV Derox is a two-stage deaerator operating at ambient temperatures. Water is sprayed into a horizontal tank under vacuum. This is then circulated into a second horizontal tank and a small amount of stripping gas (either CO_2 or N_2) is added. The normal residual O_2 level for this unit is 0.03 mg/l and values as low as 0.004 mg/l have been obtained.

The standard capacity range spans 5,000 to 70,000 l/h but units over 100 m^3/h have been supplied.

The Derox Water Deaerator – adds value

When you install an APV Derox Deaerator in your process line, you add value to your products and production.

Product uniformity

- Residual O_2 levels below 0.03 mg/l.

Economical production

- Very low residual O_2 levels in water reduce the total O_2 levels after blending with concentrates.
- Low maintenance and energy costs.
- Adjustment of operating conditions to minimise cost.

Flexible Production

- Variable capacity and high turndown.
- Easy implementation of options due to modular design.
- Compact design minimises space requirements and pipe runs.
- The APV Derox is skid mounted which allows easy relocation in the event of production restructuring.

Proven security

- Every unit leaving the APV workshop is fully tested.
- Proven functionality and reduced commissioning time.
- Easy CIP.

Functional description

The two-stage deaerator unit consists of two open horizontal tanks with circulation and discharge water pumps and a vacuum pump.

The water enters the bottom tank via a specially designed spray plate, which produces a large surface area for gas transfer. This tank is under a vacuum, so O_2 is removed at this stage.

The water leaving this tank is pumped into the top tank, which is similar in principle to the lower tank. Stripping gas (CO_2 or N_2) can be added as required after the circulation pump.
This stripping gas reduces the ability of oxygen to dissolve in the water. The remaining gases are removed in the second chamber. The water is discharged through the lower tank in such a manner that excess water can return to this tank, thus giving an internal circulation.

Orange *Citrus Sinesis*

From the top tank the deaerated water is discharged by means of a large diameter pipe. This pipe has a vent to allow a connection for both water and vacuum between the two tanks. The water level in the bottom tank is controlled by a level switch. When the level in the lower tank exceeds a preset level, the water inlet is closed. The reverse occurs when the level falls.

The water discharge is continuous controlled with a manual or pneumatic regulating valve. It is also common to feed a buffer tank where the contents determine the operation of the unit. Alarms are provided for lack of CO_2 and vacuum.

Digital instrumentation is also available improving precision and data collection.

The standard APV control consists of a controller with an operator panel. The signal exchange between the instruments/controller/control room is performed using a bus system.

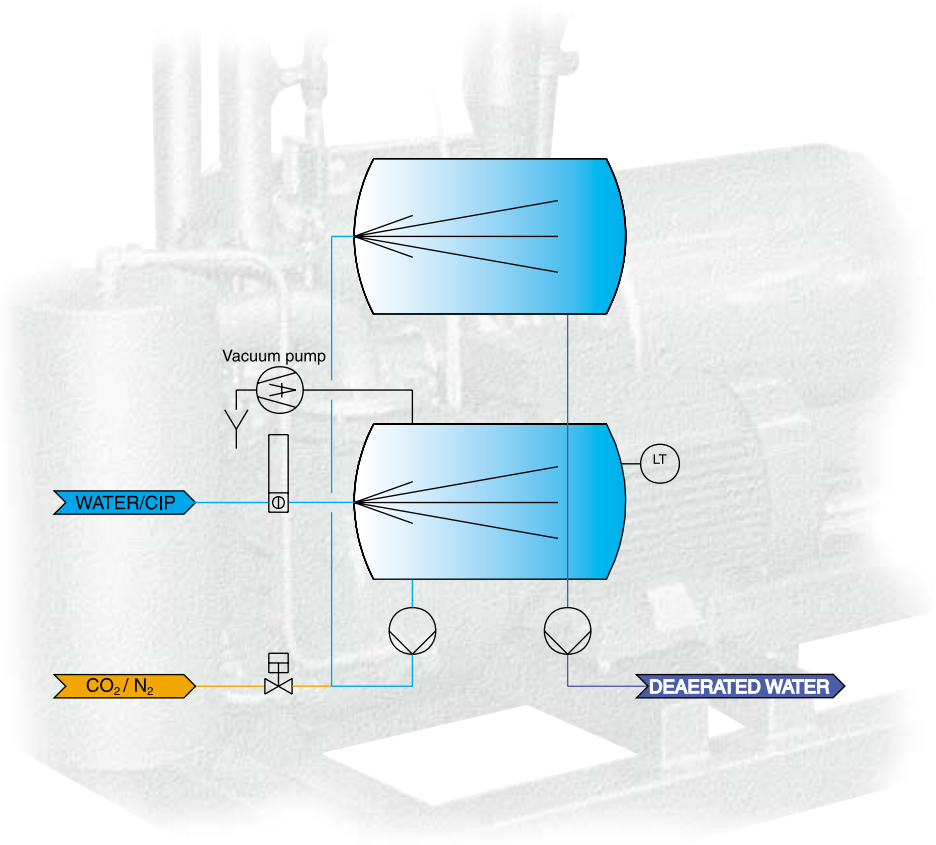
The operator panel contains the following basic features:

- Storage of 15 alarms based on the first in/first out principle.
- Status of alarms.

Other features depend upon the options selected.

Options

- Single stage deaeration with one tank with a residual O_2 level down to 0.5 mg/l.
- Deaeration without stripping gas.
- UV system for water sterilisation.
- Temperature control of feed water.
- Cooling of deaerated water.
- Pasteurisation of water.
- Inline O_2 measurement.
- Carbonation of the deaerated water.
- Stainless steel vacuum pumps (standard up to 20,000 l/h).
- Seal water cooling for vacuum pump.
- 3A design.
- Customer specific equipment.



Derox VFJ – Product Deaerator

Improve your juice quality with the Derox VFJ Deaerator

Oxygen is vital for life on earth, fuelling processes in daily life such as the metabolism of food. It is a requirement for the existence of mankind.

However reactions with oxygen also cause degradation. One of these reactions which should be avoided is the degradation of vitamin C. 1 mg of oxygen reacts with 11 mg vitamin C. If the dissolved oxygen in water is 9 mg/l, 1 l of water will destroy 99 mg of vitamin C!

Another negative effect is the oxidation of both orange and apple juices, giving a brown colouring.

For juice the normal acceptable O_2 content is 0.5 to 1.0 mg/l.

The APV Derox VFJ deaerator is intended for product deaeration. During product processing there are many possibilities of entraining air during such actions as pumping, mixing and tank filling.

The operating principle of the APV Derox VFJ is vacuum stripping. The adjustable product inlet is specially designed to ensure a thin falling film in a conical or "parasol" shape. This gives a large surface area and maximises the deaeration efficiency.

The standard capacity range spans 1,000 to 35,000 l/h.

The VFJ Product Deaerator – adds value

When you install an APV VFJ Deaerator in your process line, you add value to your products and production.

Product uniformity

- Residual O_2 levels below 0.5 to 1.0 mg/l depending on product.

Economical production

- Low maintenance and energy costs.

Flexible Production

- Variable capacity and high turndown to 50% of nominal capacity.
- Easy implementation of options due to modular design.
- Compact design minimises space requirements and pipe runs.
- The APV Parasol VFJ is skid mounted, which allows easy relocation in the event of production restructuring.

Proven security

- Every unit leaving the APV workshop is fully tested.
- Proven functionality and reduced commissioning time.
- Easy CIP.

Products

- All types of juice concentrates with fibres of up to 12 mm long.
- All types of soft drinks.
- Sugar syrup.

Apple *Malum*

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Functional description

The product is sprayed as a thin film into the vacuum vessel producing a large surface area. The vacuum reduces the boiling point of the beverage to give quick and efficient oxygen removal. The inlet is adjustable allowing the conical “parasol” film to be optimised for deaeration efficiency.

The outlet is equipped with a special level control to avoid the accumulation of fibres.

At high temperatures volatile aroma compounds may be lost. This can be avoided by equipping the VFJ with an aroma recovery unit with a recovery rate of up to 99.6%.

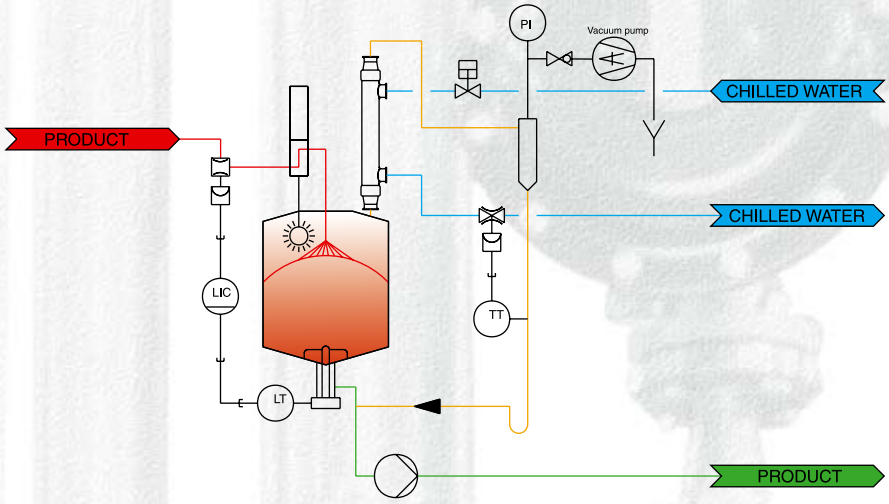
After cooling and condensing, the aroma compounds are re-introduced into the product giving a result that is almost identical to the original.

Products, which foam easily or have a high air content, can cause foaming on entry to the vacuum tank. This foam can accumulate and eventually prevent effective deaeration. This can be avoided by equipping the VFJ with a defoaming module.

Control of the VFJ is normally integrated with the main process line.

Options

- Aroma recovery unit.
- De-foaming module.
- Stainless steel vacuum pump.
- Extra large vacuum pump for cold deaeration.
- 3A design.
- Customer specified equipment/ instrumentation.
- Product testing in our Customer Test Centre.



APV Plate Evaporator

Gentle treatment for your production of high quality beverage concentrates

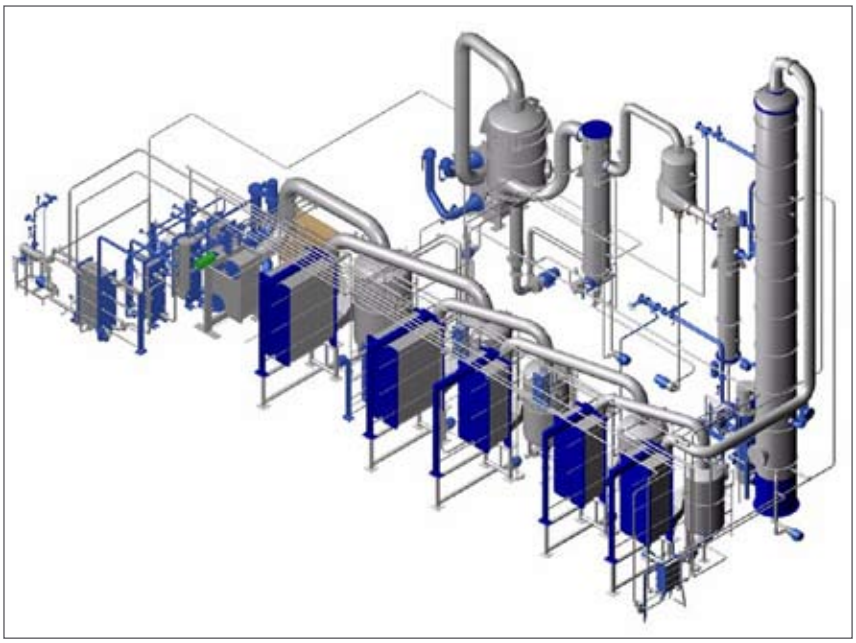
APV has a wide range of evaporation plates, which allows customisation of solutions for individual needs. APV has vast experience with installation of 1000's of evaporators. This gives APV a unique insight into the challenges that can occur. Typical considerations include minimising browning, essence recovery, oil recovery, crystallization, fouling, and steam efficiency. The combination of low hold up volume, short residence time and gentle heating results in high quality concentrate with maximum thermal efficiency.

Products

Typical beverage applications include:

- Fruit juices
- Vegetable juices
- Purees
- Coffee
- Tea

Below is a drawing showing an APV Falling Film Plate evaporator with integrated distillation essence recovery column, followed by an APV tubular evaporator to handle suspended crystals.



Mango *Mangifera indica*

Functional description

A typical flow diagram of a two effect system is shown. The product to be concentrated is fed from a balance tank to plate type preheaters. The feed liquor is preheated utilising waste heat from the evaporator, i.e. condenser cooling water, process condensate, and effect vapour. The feed is normally heated to just above the boiling point of the first effect.

The evaporator plates available are rising film, falling film, or combination of rising/falling film. The plates are arranged in alternate steam and product passages. Feed is evenly distributed between all the product passages.

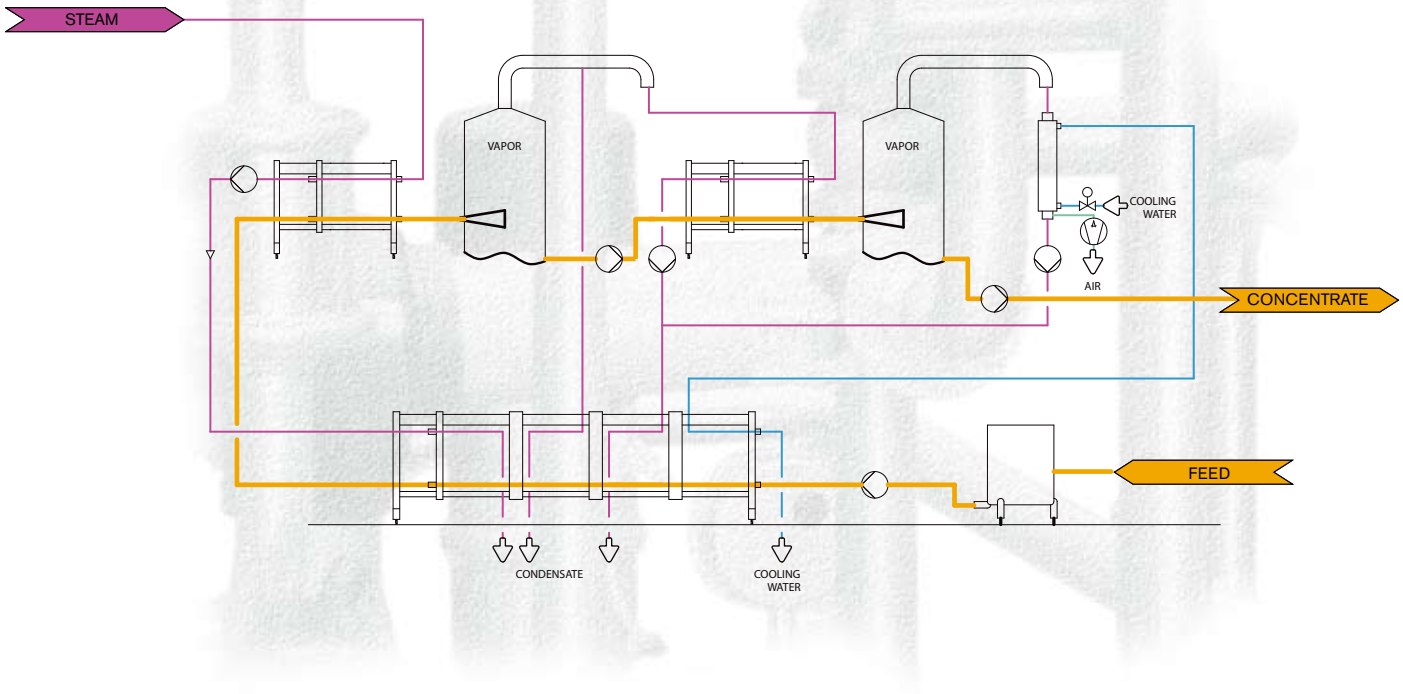
Normally the feed is introduced at a temperature slightly higher than the evaporation temperature in the plate annuli, and the ensuing flash distributes the feed liquor across the width of the plate. Rapid boiling occurs creating a thin film and resulting in low liquid volumes within the evaporator as well as high heat transfer rates.

During operation, the partially concentrated mixture exits the plate pack and enters a cyclone style vapour/liquid separator. The small droplets of liquid are centrifugally separated from the two phase mixture resulting in very clean vapour. The liquid is pumped from the bottom of the vessel and transferred to the second effect where the process is repeated to make the final concentration. Vapour from the first effect is ducted to the second effect to use as the heating media. Vapour from the second effect is ducted to a shell and tube or plate type condenser utilizing cooling water for condensing the high vacuum vapours.

To ensure stable operation only control of the feed flow, steam flow and final vacuum are needed.

Options

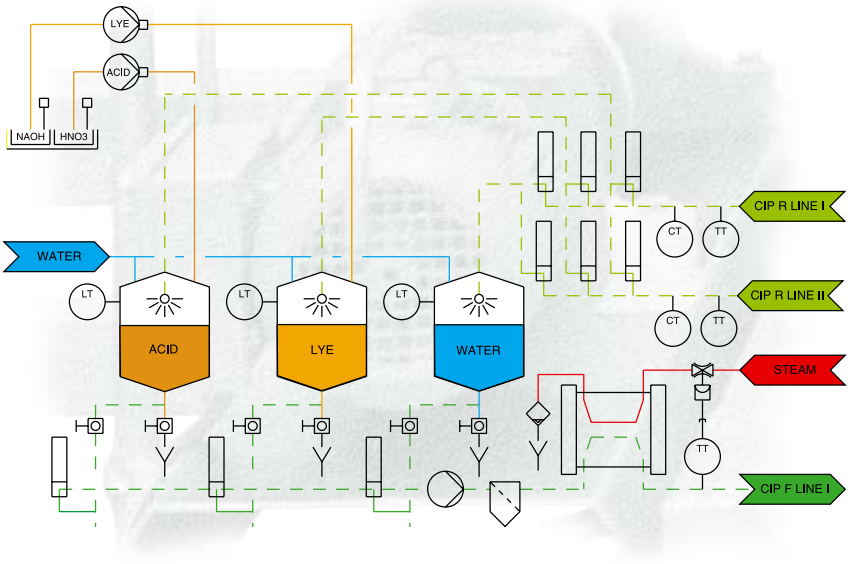
- Thermo compressors – for further steam efficiency
- Mechanical vapour recompression – offers very high efficiency where energy costs are high
- Essence recovery system – to recover volatile flavour components
- Oil recovery system – to de-oil the juice prior to evaporation
- Customised PLC – to enable quick start-up, shut down and CIP. This allows for maximum processing time and constant density control of concentrate.



CIP Master

Go for perfect cleaning results at lower cost with the APV CIP Master

The production of high quality beverages with efficient operation requires effective cleaning of the equipment. The APV CIP Master is a fully automatic system, programmed to achieve optimal cleaning of the process equipment.



The APV CIP Master – adds value

When you add an APV CIP Master to your process line, you add value to your products and production.

Product uniformity

- Fully automatic CIP programs ensure perfect cleaning.

Economical production

- Full automation reduces manpower
- Optimisation leads to reduced cleaning times.

Flexible Production

- Easy implementation of options due to modular design.
- Compact design minimises space requirements and pipe runs.
- The APV CIP Master is skid mounted which allows easy relocation in the event of production restructuring.

Proven security

- Every unit leaving the APV workshop is fully tested.
- Proven functionality and reduced commissioning time.

Functional description

The APV CIP Master is a fully automatic self contained unit. The unit comprises a complete set of equipment for CIP, including for example, tanks for water, acid and caustic soda, pumps, tubular and/or plate heat exchangers, valves and instrumentation such as conductivity and flow transmitters.
The CIP program covers the complete cycle.

Detergent or water selection, detergent concentrations and cycle temperatures and times are fully controlled.
The CIP programs are especially designed for low pH products including juices. These products, for example orange juice, do not require frequent acid cleaning so this procedure is an independent sequence within the program. Product differences such orange juice containing pulp or apple juice are also integrated into the CIP program.
The APV CIP Master is fully integrated with the process line and can be used with existing equipment (including filling machines) as well as new APV units.

The design of the CIP Master by APV incorporates the requirements of production schedules to minimise downtime. This forms the basis for selecting the appropriate tank numbers and volumes together with the number of lines.

The standard APV control consists of a controller with an operator panel. The signal exchange between the instruments/controller/control room is performed using a bus system.

Options

- 3, 4 or 5 tank systems.
- Different tank sizes.
- Number of lines.
- Tubular or plate heat exchangers.
- Low cost manual CIP systems.
- 3A design.
- Product testing in our Customer Test Centre.
- Customer specific equipment.

Peach *Prunus Persica*

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For more information about our worldwide locations, approvals, certifications, and local representatives, please visit www.apv.com.

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