The Process Technology Company

"We are your reliable partner from planning and design through to commissioning of your plant."

"Centec offer fully automated, skid-mounted process units and high precision measurement technology from a single source."

"Our systems and sensors are engineered to perfectly meet the most demanding requirements for your specific application."

Dr. Robert Koukol, Owner & CEO

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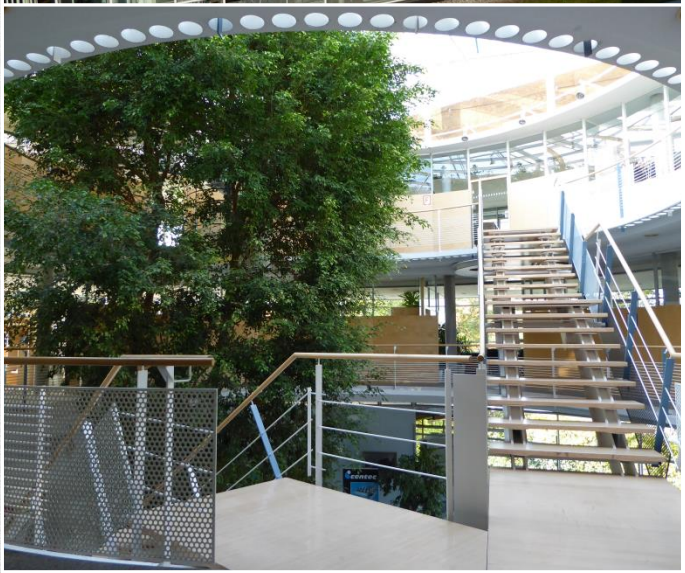
The Centec Group: German Headquarters



Centec GmbH

Wilhelm-Röntgen-Strasse 10

63477 Maintal. Germany

info@centec.de

- General Management
- Purchasing, Sales & Service
- Development, Design & Engineering
- Sensor Manufacturing

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The Centec Group: Czech Subsidiaries

Prague Plant

- Detail Engineering
- Automation Engineering
- Switch Cabinet Manufacturing

Horatev Plant

- Materials Warehouse
- Tank & Skid Manufacturing
- Factory Acceptance Tests

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The Centec Group: Horatev Industrial Park

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The Centec Group: Global Presence

Centec subsidiaries and a network of sales partners

- Centec GmbH, Germany
- Centec automatica sro, Czech Republic
- Centec UK, Great Britain
- Centec LLC, USA
- Centec Technology Co Ltd, China
- Centec Predstavništvo u Beogradu, Serbia
- Centec RRR Systems & Sensors Pvt Ltd, India
- Centec América Latina Ltda, Brazil

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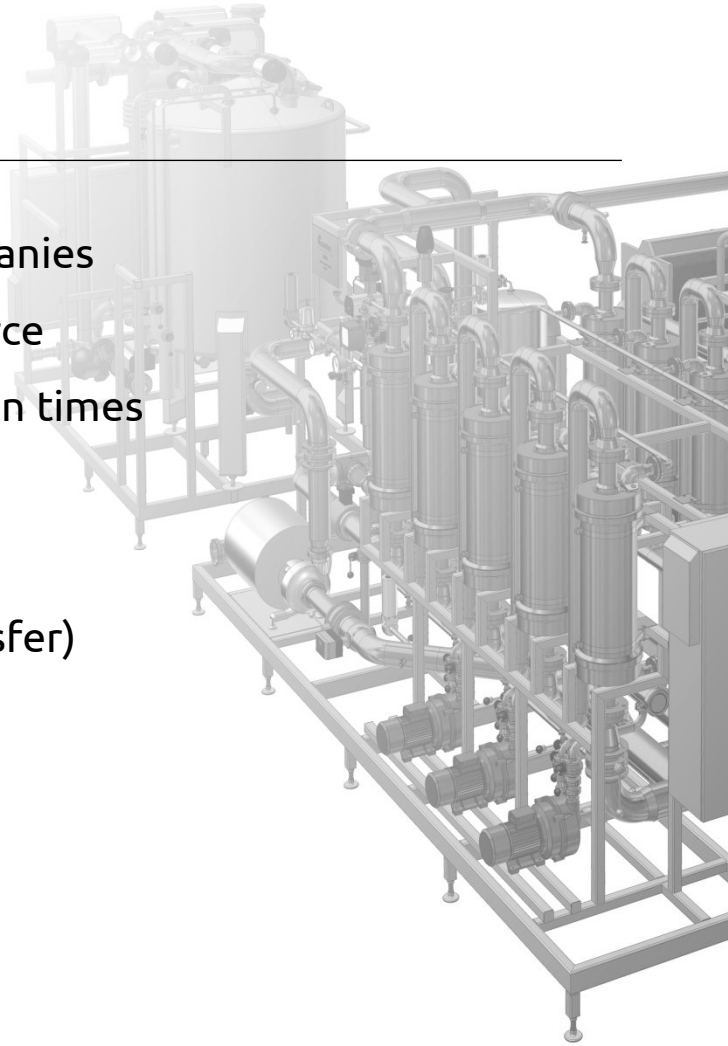
The Centec Group: Specialities

What sets us apart from the competition

- German based, privately owned group of companies
- Process systems and sensors from a single source
- High degree of customization and short reaction times
- Modular design and large variety of materials
- FAT at Centec facilities; commissioning on-site
- Local services (qualification, training, tech transfer)
- Approved SIEMENS Solution Partner
- Strong, global customer base



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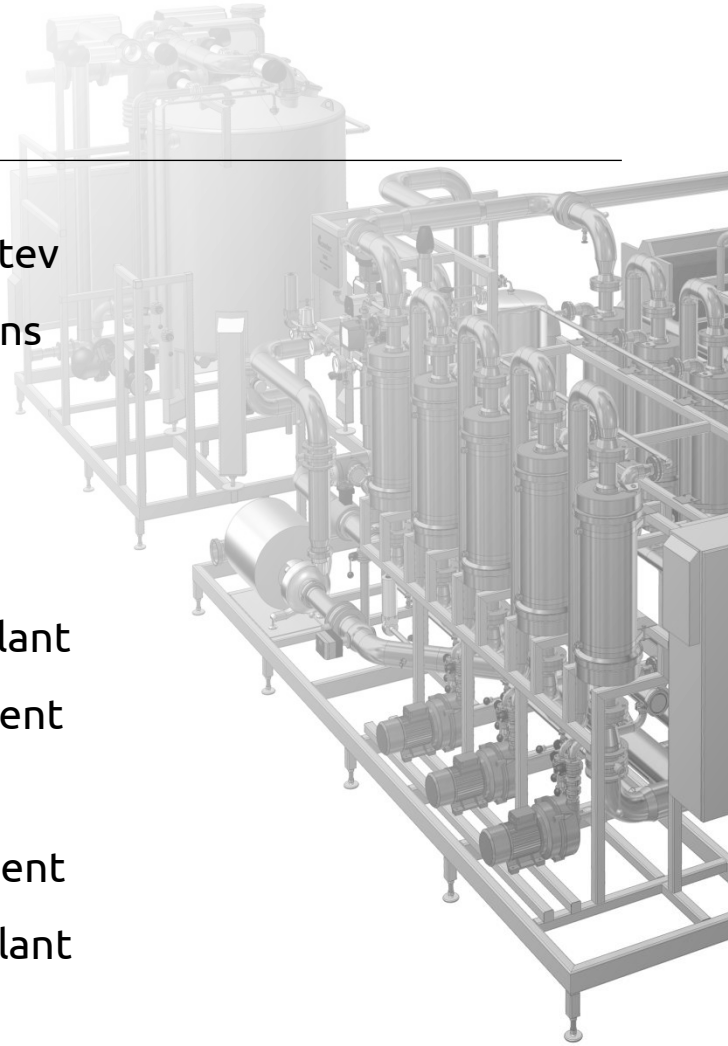
The Centec Group: History

Centec in the twenty-first century

2014	start of own tank manufacturing in Horatev
2013	first greenfield plant for infusion solutions
2012	laboratory density measurement
2010	first complete brewery cold block
2007	dealcoholization
2006	first turn-key Water for Injection (WFI) plant
2006	high precision optical oxygen measurement
2005	column water deaeration
2003	high precision carbon dioxide measurement
2002	first turn-key High Purity Water (HPW) plant



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The Centec Group: History

Centec in the twentieth century

1998	multi component mixing
1997	flash pasteurization
1995	membrane water deaeration
1994	carboblending
1993	yeast pitching and wort aeration
1991	carbonation
1990	start of process systems manufacturing
1990	Dr. Robert Koukol becomes Managing Director
1976	high precision concentration measurement
1976	Dr. Hubert Koukol establishes the company

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The Centec Group: Market Segments





Beverage & Food

- Brewery
- Soft Drink
- Wine, Cider & Spirit
- Food & Dairy

Chemical, Pharma & Energy

- Chemical
- Electronics & Semiconductor
- Pharma & Biotech
- Power Plants
- Petrochemical & Biofuel

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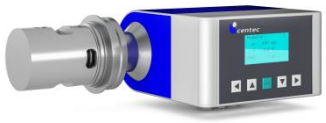
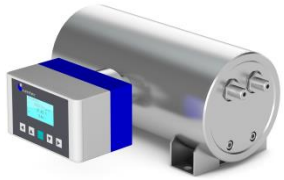
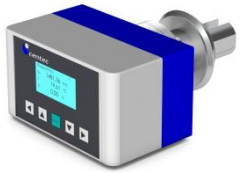
High Precision Sensors: Overview

				
OXYTRANS	**CARBOTEC**	**RHOTEC**	**SONATEC**	**COMBITEC**
measurement:				
O_2 concentration, temperature	CO_2 concentration, temperature	density, temperature	sound velocity, temperature	density, sound velocity, temperature
determination:				
O_2 concentration	CO_2 concentration	concentration (2-component solution)	concentration (2-component solution)	concentration (3-component solution)

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High Precision Sensors: OXYTRANS TR

Dissolved oxygen (DO) in food and beverages has adverse impact on flavour stability and shelf life.
In feed water systems it is a prime cause of corrosion.

- Precise and immediate determination of oxygen content in liquids and gases
- Proven optical technology; no need for electrolyte and membrane changes
- Short response time and excellent long-term stability
- Hygienic design; CIP-capable
- Virtually maintenance free

Technical Data

Temperature	-5°C - +98°C
Pressure	max. 12 bar
Liquid Phase	
Range I	1 ppb - 2 ppm (±1 ppb)
Range II	30 ppb - 35 ppm (±30 ppb)
Gas Phase	
Range I	0 - 4,2 % (±0,002 %)
Range II	0 - 50 % (±0,03 %)

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High Precision Sensors: OXYTRANS M

Dissolved oxygen (DO) in food and beverages has adverse impact on flavour stability and shelf life.
In feed water systems it is a prime cause of corrosion.

- Precise and immediate determination of oxygen content in liquids and gases
- Proven optical technology; no need for electrolyte and membrane changes
- Short response time and excellent long-term stability
- Sturdy aluminum housing
- Virtually maintenance free

Technical Data

Temperature	-5°C - +98°C
Pressure	max. 12 bar
Liquid Phase	
Range I	1 ppb - 2 ppm (±1 ppb)
Range II	30 ppb - 35 ppm (±30 ppb)
Gas Phase	
Range I	0 - 4,2 % (±0,002 %)
Range II	0 - 50 % (±0,03 %)

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High Precision Sensors: OXYTRANS TR

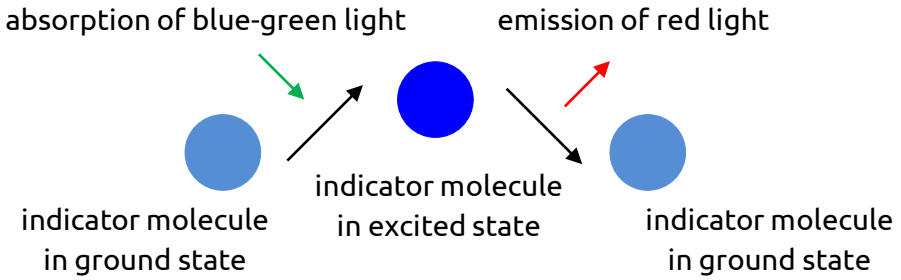
- Indicator molecules in the sensor head are illuminated with blue-green-light
- The molecules absorb this light and are excited to a higher energy state
- They emit red light which is detected
- If oxygen is present the energy is transferred to the oxygen molecules
- The measured red light signal decreases linear with the O_2 content in the product

Typical Applications

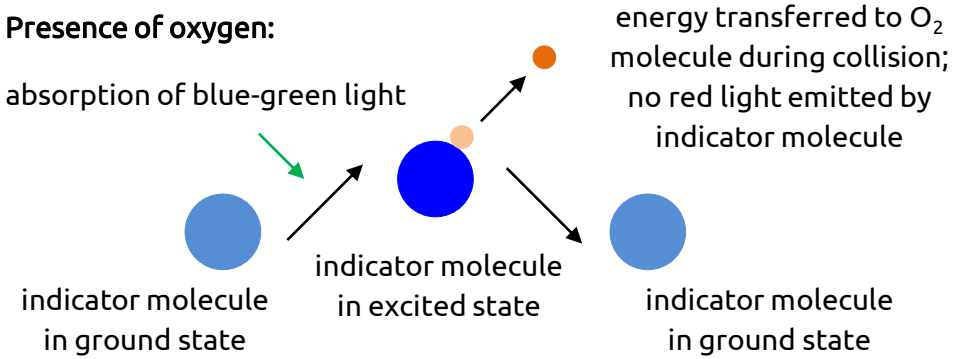
- *Column water deaeration*
- *Membrane water deaeration*
- *Vacuum deaeration*
- *Wort aeration*
- *CO_2 recovery*
- *Yeast management*
- *Quality control before filling*

Measurement Principle

Absence of oxygen:



Presence of oxygen:



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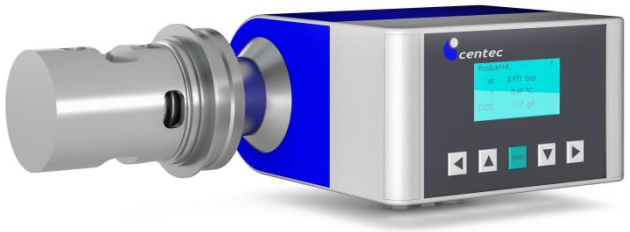
High Precision Sensors: CARBOTEC TR-PT



Dissolved CO_2 in food and beverages has major impact on quality and taste. In various industries CO_2 needs to be monitored, e. g. during fermentation reactions.

- Precise and immediate determination of carbon dioxide content in liquids
- Proven technology based on in-line pressure-temperature measurement
- Several measurement cycles per minute
- No product loss due to measurement
- Hygienic design; CIP-capable
- Easy to maintain

Technical Data

Temperature	-10°C - +100°C
Pressure	max. 10 bar
Range	0 - 10 g/l
Accuracy	±0,05 g/l

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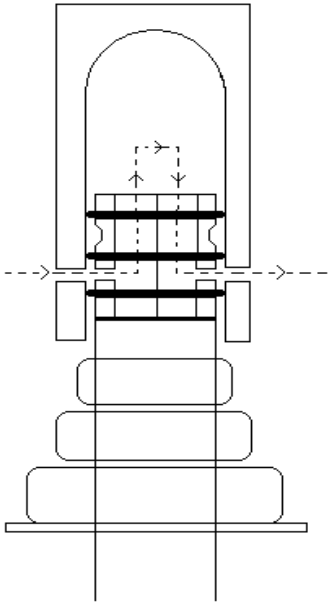
High Precision Sensors: CARBOTEC TR-PT

- A sample of the carbonated product is taken from the main product stream (A)
- The increase of volume forces the CO_2 out of the product into the gas phase causing a pressure change inside the sensor (B)
- The pressure changes according to the amount of carbon dioxide in the sample
- By pressure measurement in the sensor, the content of CO_2 can be determined

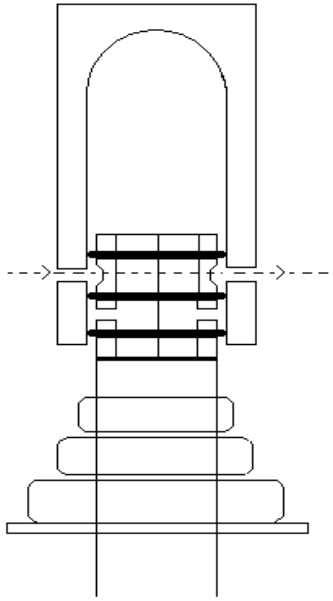
Typical Applications

- *Carbonation*
- *Carboblending*
- *Decarbonation*
- *Dealcoholization*
- *Quality control before filling*

Measurement Principle



(A) piston up
inlet and outlet open;
new sample taken;
old sample returned



(B) piston down
inlet and outlet closed;
volume of chamber increased;
pressure and temperature measured for CO_2 calculation

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High Precision Sensors: CARBOTEC NIR

Dissolved CO_2 in food and beverages has major impact on quality and taste. In various industries CO_2 needs to be monitored, e. g. during fermentation reactions.

- Precise and immediate determination of carbon dioxide content in liquids
- Measurement based on Attenuated Total Reflection (ATR) technology
- Determination of “true” CO_2 content not influenced by any other gases
- No product loss due to measurement
- Hygienic design; CIP-capable
- Virtually maintenance free

Technical Data

Temperature	-10°C - +85°C
Pressure	max. 10 bar
Range	0 - 10 g/l
Accuracy	±0,1 g/l

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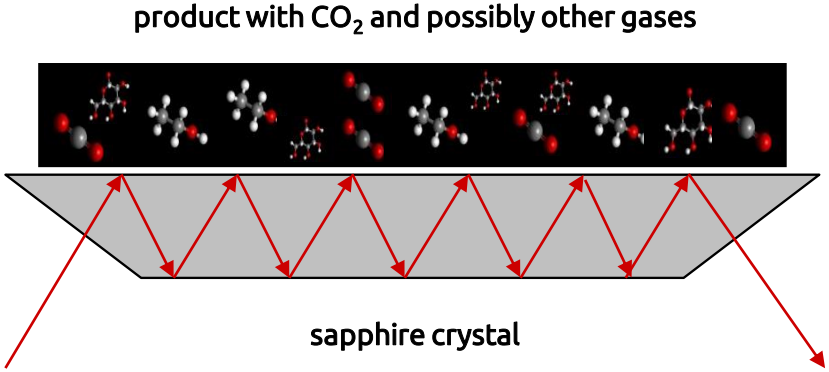
High Precision Sensors: CARBOTEC NIR

- Near Infrared light (NIR) is reflected at the surface when transmitting a crystal
- The surface of the crystal is in direct contact to the carbonated product
- Only CO_2 molecules absorb the specific wavelength of the transmitting light
- Each reflection reduces the intensity of the light according to the carbon dioxide content in the product

Measurement Principle



Typical Applications

- *Carbonation*
- *Carboblending*
- *Decarbonation*
- *Dealcoholization*
- *Quality control before filling*

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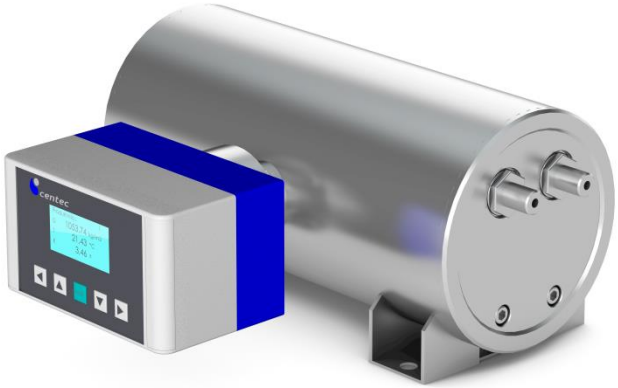
High Precision Sensors: RHOTEC



Concentrations are monitored in many manufacturing processes and for quality control, e. g. the content of sugar and alcohol or the concentration of acids

- Based on density measurement, the concentration of a media dissolved in a liquid is determined with highest precision
- Patented compact design with local display
- Large variety of materials available
- Ideally suited for process control e. g. liquid blending and dosing applications
- Hygienic design; CIP-capable
- Maintenance-free

Technical Data

Temperature	-25°C - +125°C
Pressure	max. 50 bar
Range	0 - 3 g/cm³
Accuracy	±0,0001 g/cm³

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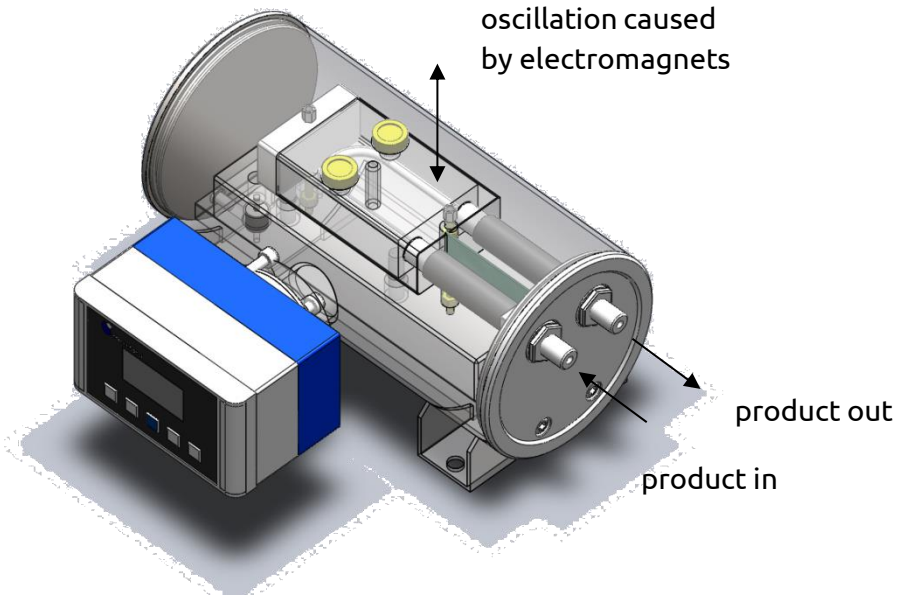
High Precision Sensors: RHOTEC

- The liquid flows through an U-shaped tube which is electronically excited to oscillate at its characteristic frequency
- The frequency is affected by smallest changes in the density of the liquid
- Based on density measurement, the concentration is calculated and displayed
- Temperature drifts are compensated for by an internal Pt1000 sensor

Typical Applications

- *Monitoring of e. g. dissolving, evaporation, crystallization processes*
- *Quality control and phase detection*
- *Liquid blending and dosing*
- *Milk standardization*
- *Dealcoholization*

Measurement Principle



The U-shaped tube serves as a bypass to the main product line;
it is electronically excited to oscillate at its characteristic frequency:
low density liquid > high frequency; high density liquid > low frequency

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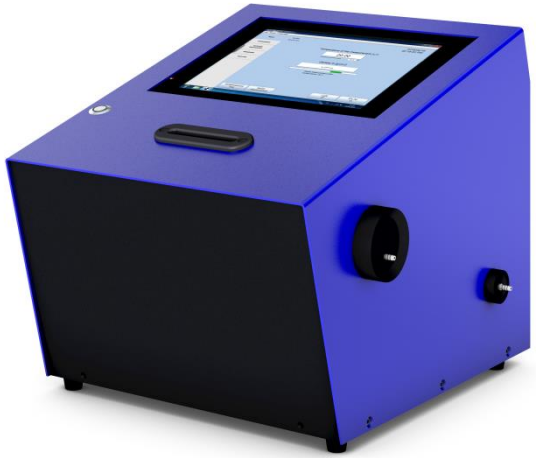
High Precision Sensors: RHOTEC L



Concentrations are monitored in many manufacturing processes and for quality control; very often such measurements are done in the lab with small samples.

- Based on density measurement, the concentration of a media dissolved in a liquid is determined with highest precision
- Oscillating U-tube principle as for RHOTEC
- Ideally suited for small sample volumes
- User-friendly 10” touch screen available
- Software compatible to MS Windows ®
- Various interfaces for data exchange (USB, WLAN, Ethernet)

Technical Data

Temperature	+5°C - +85°C
Range	0 - 3 g/cm^3
Accuracy	±0,0001 g/cm^3
Sample	approx. 2 ml
Weight	approx. 22 kg

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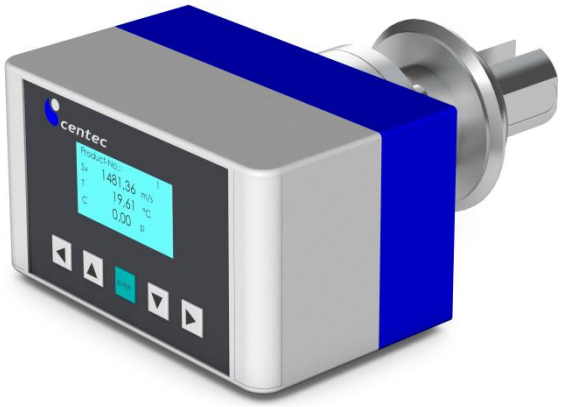
High Precision Sensors: SONATEC



Concentrations are monitored in many manufacturing processes and for quality control, e. g. the content of sugar and alcohol or the concentration of acids.

- Based on sound velocity measurement, the concentration of a media dissolved in a liquid is determined with highest precision
- Patented compact design with local display
- Large variety of materials available
- Ideally suited for process control e. g. liquid blending and dosing applications
- Hygienic design; CIP-capable
- Maintenance-free

Technical Data

Temperature	-25°C - +125°C
Pressure	max. 16 bar
Range	400 - 3.000 m/s
Accuracy	±0,05 m/s

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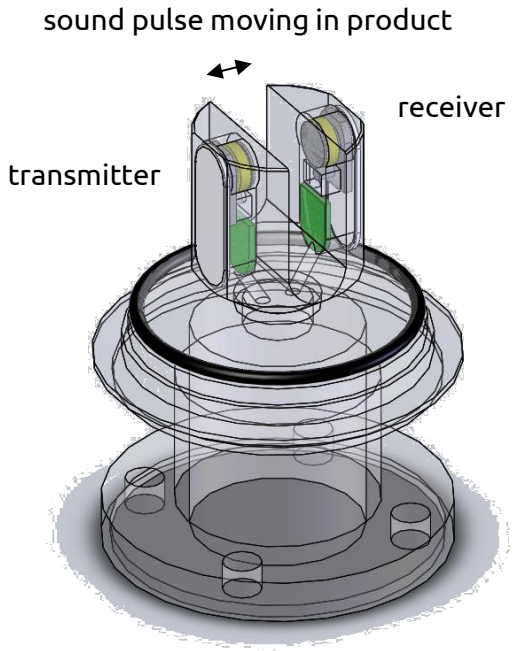
High Precision Sensors: SONATEC

- The liquid flows through the sensor head which is in the main product line
- The speed of a sound pulse between a transmitter and a receiver is measured
- A piezo-element generates the pulse
- The concentration is calculated based on sound velocity measurement
- Temperature drifts are compensated for by an internal Pt1000 sensor

Typical Applications

- *Monitoring of e. g. dissolving, evaporation, crystallization processes*
- *Quality control and phase detection*
- *Liquid blending and dosing*
- *Evaporation of sugar syrup*
- *Dealcoholization*

Measurement Principle



The speed of sound between a transmitter and a receiver is measured; the sound pulse is moving perpendicular to the product flow in the main product line

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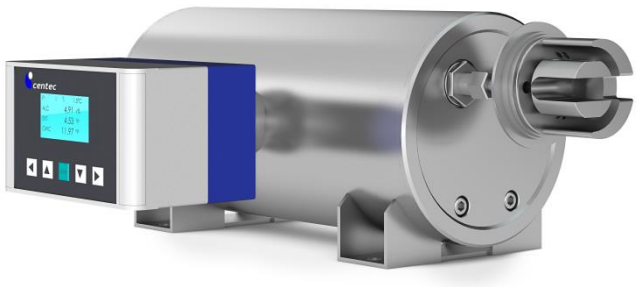
High Precision Sensors: COMBITEC



3-component solutions consist of two media dissolved in one liquid; COMBITEC is ideally suited to determine the concentrations of both media simultaneously.

- Based on combined sound velocity measurement and fluid density sensing
- Patented compact design with local display
- Large variety of materials available
- Applicable for monitoring fermentation processes or chemical reactions like the production of formaldehyde and H_2SO_4
- Hygienic design; CIP-capable
- Maintenance-free

Technical Data

Temperature	-25°C - +125°C
Pressure	max. 16 bar
Density	
Range	0 - 3 g/cm³
Accuracy	±0,0001 g/cm³
Sound Velocity	
Range	400 - 3.000 m/s
Accuracy	±0,05 m/s

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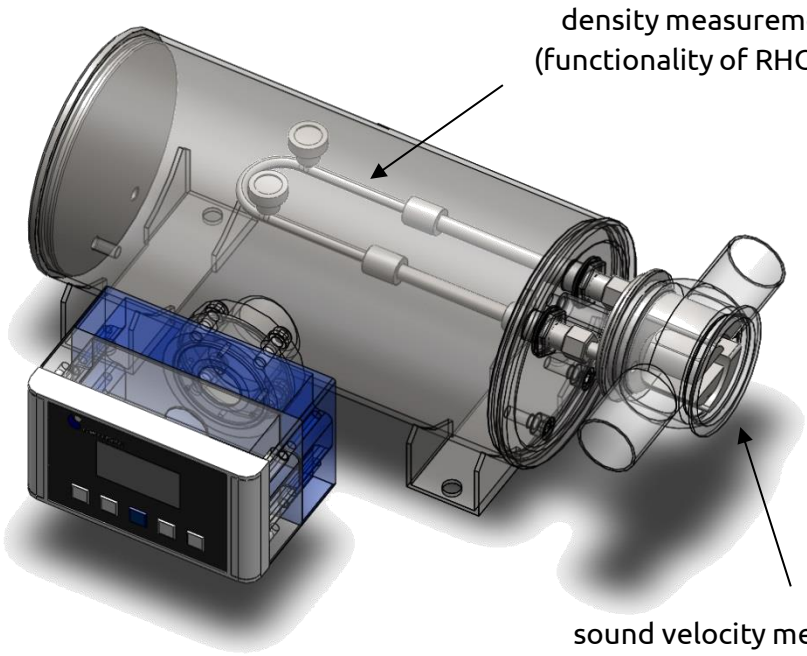
High Precision Sensors: COMBITEC

- One part of the liquid flows through the U-shaped tube inside the sensor for high precision density measurement
- Another part of the liquid flows trough the main product line where the speed of sound in the product is measured
- COMBITEC combines the functionality of RHOTEC and SONATEC in one device
- Temperature drifts are compensated

Typical Applications

- *Extract - alcohol - water*
- *Methanol - formaldehyde - water*
- *Sodium chloride - caustic soda - water*
- *Oleum - sulphuric acid - water*

Measurement Principle



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High Precision Sensors: Concentration Measurement


Applications in beverage & food industry

- Extract at lauter tun, wort kettle and wort cooler in breweries
- Alcohol, extract and original gravity (°Plato) after fermentation in breweries
- Extract (°Oechsle) in grape juice and alcohol after fermentation in wineries
- Sugar (°Brix) during sugar dissolving in beverage and food manufacturing
- Sugar (°Brix) during blending of product with sugar syrup
- Concentration during blending of water with concentrate
- Milk fat content during milk standardization in dairies
- Product concentration for phase detection, e. g. before filling
- Sugar (°Brix) content during evaporation of sugar syrup in sugar mills
- Coffee extract content during production of instant coffee
- Concentration of CIP media such as NaOH and peracetic acid

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High Precision Sensors: Concentration Measurement

Applications in chemical, pharma & energy industry

- Corrosive acids (HF, HCl, HNO_3, H_3PO_4, H_2SO_4) used for e. g. batteries, explosives, fertilizers, etching, coating, cleaning baths
- Oleum ($H_2S_2O_7$) during production of sulphuric acid (H_2SO_4)
- Hydrogen peroxide (H_2O_2) used for bleaching, disinfection, etching
- (Crude) oil for phase detection in petrochemical plants
- Glycol or oil in water used as cooling medium
- Rolling and cutting oil emulsions in metal industries
- Coolants, lubricants, antifreezes for automotives
- Ethanol during fermentation in bioethanol industries
- Boric acid (H_3BO_3) used as absorbent in nuclear power plants
- Abrasive materials in water in hydropower plants

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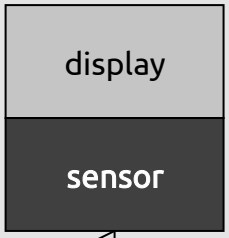
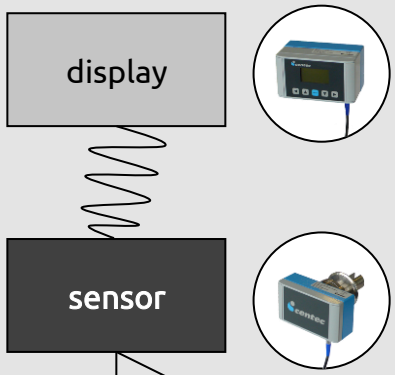
High Precision Sensors: Sensor Control Options

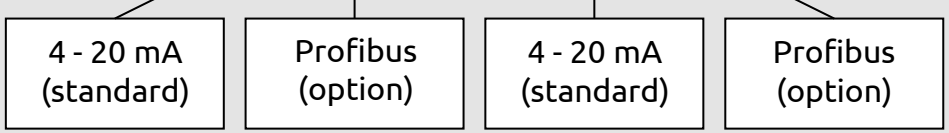
sensor with local display (“transmitter”)

compact unit

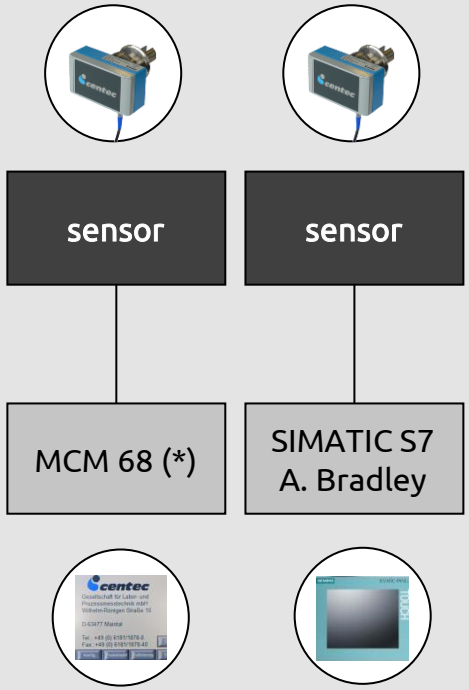


separated by cable





sensor with PLC



(*) MCM 68 is a PLC system developed by Centec that can control up to four different sensor types.

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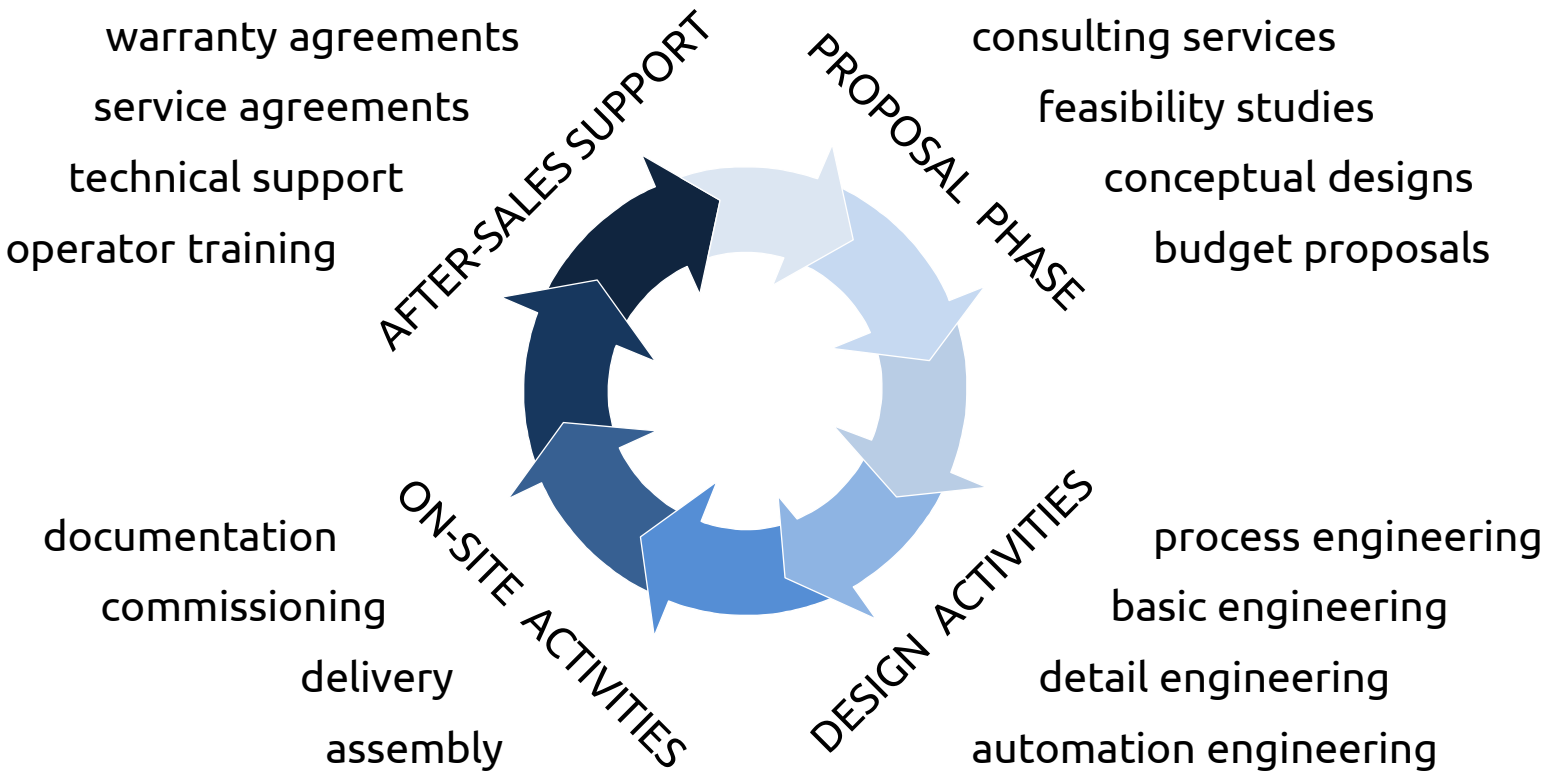
Automated Process Skids: Project Management



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IONTEC: Water Softening & Demineralization

Capacity	10 - 1.500 hl/h (1 - 150 m^3/h)
Material	according to requirements
Options	different automation levels
	hardness measurement
	pre-filtration
	Cleaning-in-Place (CIP)

For optimum taste of the product, water used in beverage industries needs to be softened. Water hardness causes scale deposits in pipes and vessels.

- For softening of water, a cation resin containing loosely bound Na^+ ions is used
- The hardness forming Ca^{2+} and Mg^{2+} ions in the water are exchanged by the Na^+ ions
- When most of the sodium ions have been replaced, the resin needs to be regenerated
- For demineralization, the water passes through a cation and an anion resin
- Mixed bed designs are available

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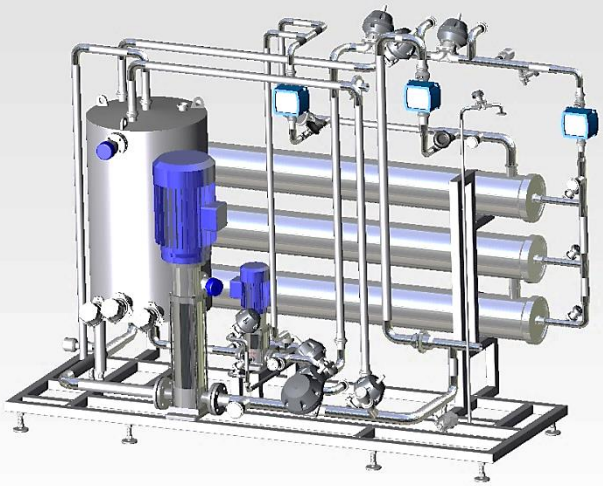
REVOTEC: Reverse Osmosis (RO)



Capacity	10 - 1.500 hl/h (1 - 150 m^3/h)
Material	according to requirements
Options	different automation levels
	blending permeat/raw water
	conductivity measurement
	water pre-treatment
	disinfection
	Cleaning-in-Place (CIP)

RO removes most of the total dissolved solids (minerals, salts, metals) to improve the purity of water as required for various process applications.

- Designed as required by the raw water quality and the specific application
- Water is purified by passing through a semi-permeable membrane at high pressure reversing the natural osmosis
- In beverage manufacturing, RO is usually the final step in a water treatment regime
- By subsequent steps, even higher purity (PW, HPW, WFI quality) can be reached

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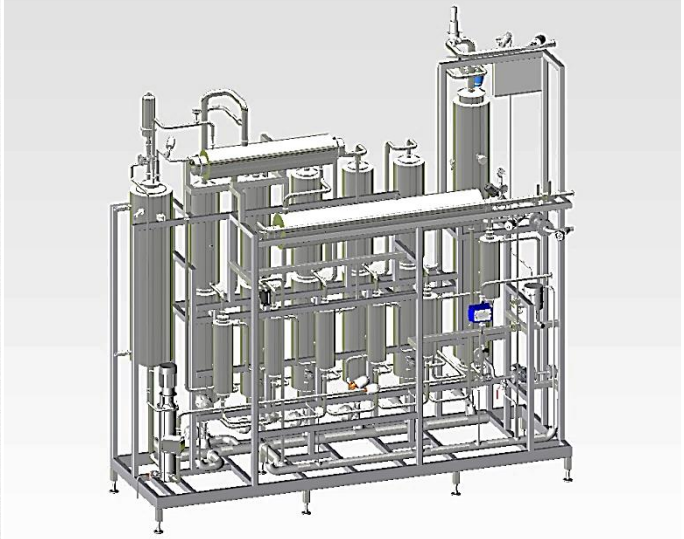
DeStill: Water for Injection (WFI) Distillation



Capacity	0 - 20 m^3/h
Material	according to requirements
Options	different automation levels
	water pre-treatment
	combined steam generation
	WFI storage
	WFI distribution (loop)

For the production of medicines for parenteral administration and for certain cleaning applications sterile, pyrogen-free WFI quality water is required.

- The skid consists of up to 8 interconnected columns producing pyrogen-free steam
- Each column is heated by steam generated in the previous stage; for the first column external energy is used as heating medium
- At the outlet of the system all pure steam condenses into WFI to be further processed
- The skid can be designed for combined WFI and pure steam generation at the same time

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PureSteam: Pure Steam Generation

Capacity	0 - 15.000 kg/h
Material	according to requirements
Options	different automation levels
	water pre-treatment
	conductivity measurement
	combined WFI generation
	pure steam distribution (loop)

Where more stringent hygienic standards apply, pure steam is used for sterilization of all wetted surfaces inside pipes, tanks and filling machines.

- Applicable for Sterilization-in-Place (SIP)
- A tubular heat exchanger produces steam that enters a separation column above
- Any droplets that may contain contaminants are effectively separated from the steam due to gravity and the specific column design
- The generated steam is pyrogen-free
- The skid can be designed for combined WFI and pure steam generation at the same time

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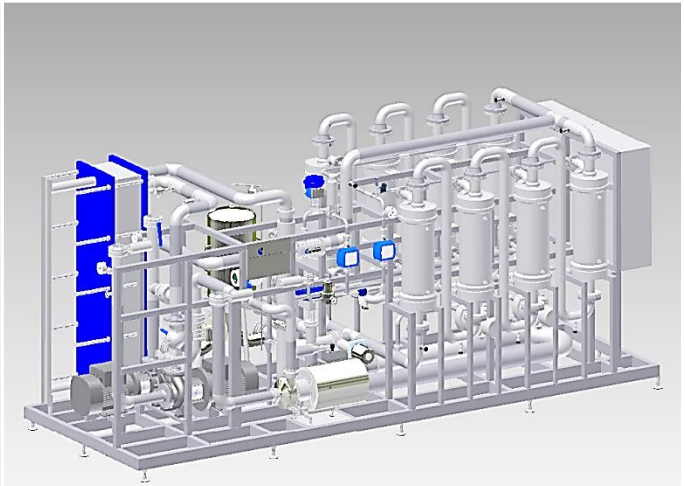
DGS: Membrane Water Deaeration



Capacity	10 - 2.000 hl/h (1 - 500 m^3/h)
Residual O_2	< 10 ppb
Material	according to requirements
Options	different automation levels
	in-line O_2 measurement
	activated carbon filtration
	carbonation
	disinfection

Dissolved oxygen (DO) in food and beverages has adverse impact on flavour stability and shelf life.
In feed water systems it is a prime cause of corrosion.

- Very compact skid equipped with highly effective hollow fibre membrane modules
- Water flows along the outer side of the membranes; through their inner side and in counter current passes strip gas (CO_2 or N_2)
- The O_2 partial pressure difference forces the O_2 out of the water into the membranes where is flows away with the strip gas
- Easily expandable; low gas consumption

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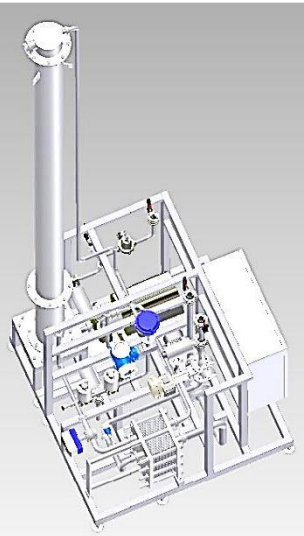
DeGaS-Cold: Column Water Deaeration Cold



Capacity	10 - 2.000 hl/h (1 - 200 m^3/h)
Residual O_2	< 10 ppb
Material	according to requirements
Options	different automation levels
	double column design
	in-line O_2/CO_2 measurement
	carbonation
	disinfection

Dissolved oxygen (DO) in food and beverages has adverse impact on flavour stability and shelf life.
In feed water systems it is a prime cause of corrosion.

- Water at ambient temperature runs top down a column containing structured packing that maximizing the contact area between water and strip gas (CO_2 or N_2)
- The gas flows in counter current to the water
- The O_2 partial pressure difference forces the oxygen out of the water into the gas
- The oxygen leaves the column at its top
- Optionally, vacuum can be applied

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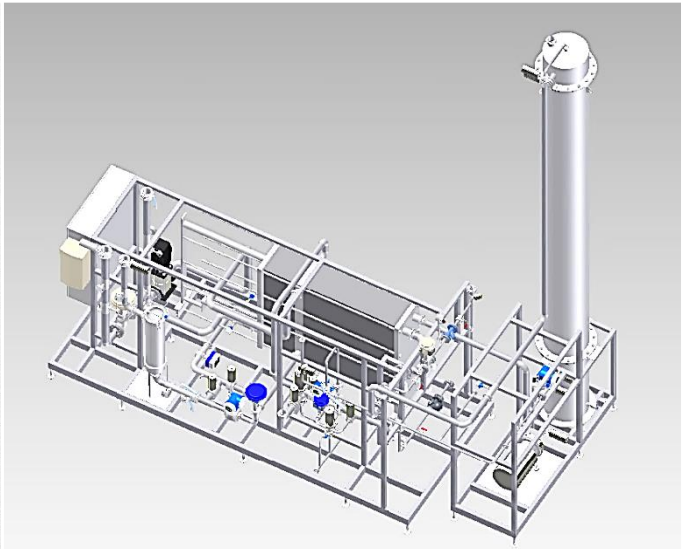
DeGaS-Hot: Column Water Deaeration Hot



Capacity	10 - 2.000 hl/h (1 - 200 m^3/h)
Residual O_2	< 10 ppb
Material	according to requirements
Options	different automation levels
	double column design
	in-line O_2/CO_2 measurement
	carbonation

Dissolved oxygen (DO) in food and beverages has adverse impact on flavour stability and shelf life.
In feed water systems it is a prime cause of corrosion.

- For simultaneous disinfection, water is heated to approx. 75 °C; the water runs top down a column containing structured packing that maximizing the contact area between water and strip gas (CO_2 or N_2)
- The gas flows in counter current to the water
- The O_2 partial pressure difference forces the oxygen out of the water into the gas
- The oxygen leaves the column at its top

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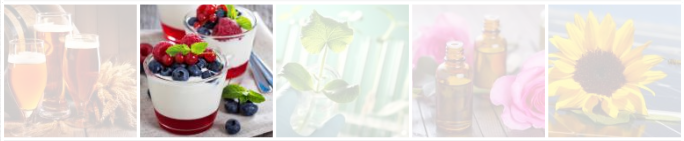
VeGaS: Vacuum Deaeration



Capacity	50 - 1.500 hl/h
Residual O_2	depending on application
Material	according to requirements
Options	different automation levels
	in-line O_2/CO_2 measurement
	liquid blending & dosing
	carbonation
	pasteurization

Dissolved oxygen (DO) in dairy products and liquid food (soy milk, mustard, mayonnaise, ketchup, etc.) has adverse impact on flavour stability and shelf life.

- For deaeration the product is sprayed as very fine bubbles into an evacuated vessel
- The O_2 partial pressure difference forces the oxygen out of the product into the gas
- To enhance system performance and for product carbonation, carbon dioxide can be added into the vessel as a strip gas
- The deaerated product falls to the bottom of the vessel and is further processed

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EASYOMER: Hops Pre-Isomerization

Capacity	min. 500.000 hl beer per year
Hops Types	natural, pellets, extract
Hops Saving	up to 30 %
Material	according to requirements
Options	different automation levels
	in-line O_2 measurement
	conductivity measurement
	pH measurement

EASYOMER increases the yield of iso-alpha acid from the hops product; this reduces the required amount of hops by up to 30 % and saves energy for wort boiling.

- New, scientifically proven heat treatment technique with hops specific parameters (temperature, pressure, pH, heating time)
- The pre-isomerization stage is separate from the brewing process (wort boiling)
- In compliance with the “German Purity Law” and without effect on beer taste
- Applicable for natural hops, pellets, extract
- Easy installation into the existing process

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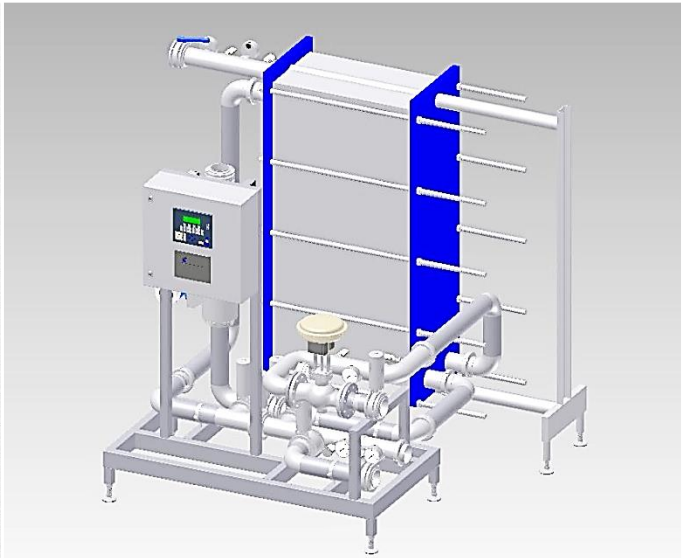
Wort Cooler: Cooling of Wort



Capacity	10 - 1.000 hl/h
Material	according to requirements
Options	different automation levels
	splash guard
	booster pump
	CIP connection for
	CIP back flushing

The Wort Cooler reduces the temperature of wort to the required pitching temperature. For cider manufacturing, a Juice Cooler can be designed.

- A plate heat exchanger is used for cooling
- Cooling is performed in one or two stages
- In a single-stage process, cold brewing water is used as the only cooling medium
- In a two-stage process, the hot wort is first cooled by tap water to approx. 20 °C and then secondly by glycol, ammonia or brine
- The energy extracted from the hot wort is returned back to the brewing process

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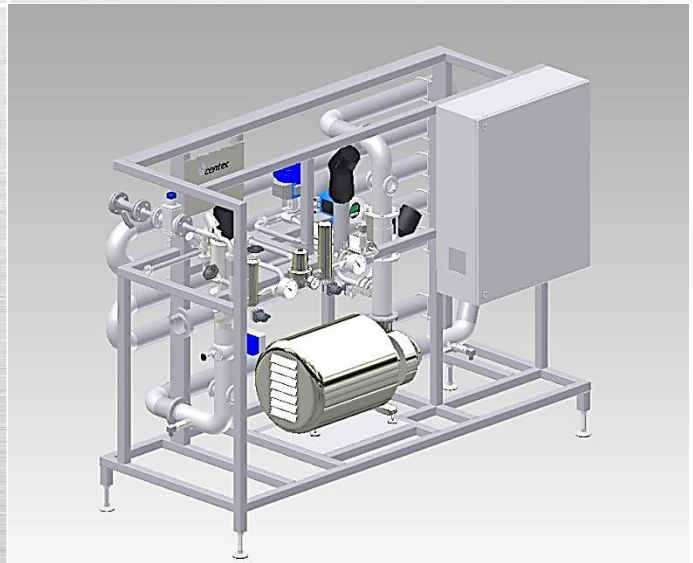
Wort Aerator: Aeration of Wort



Capacity	10 - 3.000 hl/h
Range O_2	8 - 40 ppm
Material	according to requirements
Options	different automation levels
	in-line O_2 measurement
	sterile air filtration
	booster pump
	wort cooler

The Wort Aerator is used for highly accurate injection of oxygen or sterile air into the beer wort. For cider manufacturing, a similar system can be designed.

- Oxygen is required for yeast growth and the establishment of the yeast culture
- Accurate and continuous aeration of wort with highly precise optical oxygen measurement and reliable flow meters
- A Vortex injector automatically delivers the right amount of oxygen that mixes fast and homogeneously with the wort
- Manual or fully automated operation

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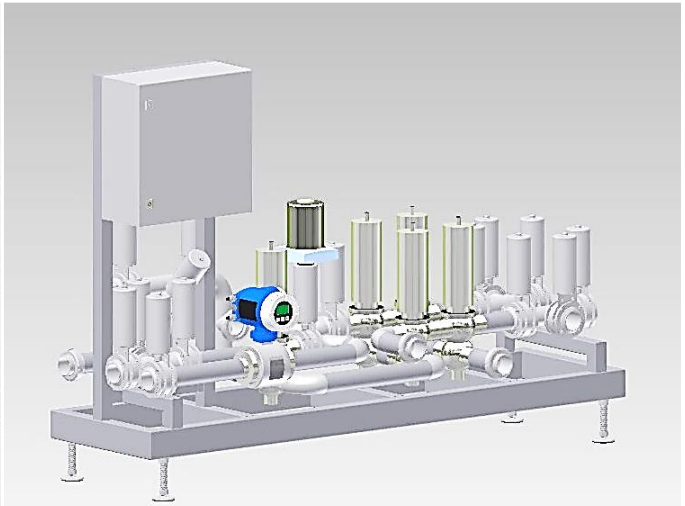
YeastPitch: Pitching of Yeast



Capacity	10 - 3.000 hl/h
Dosing Yeast	0 - 100 Mio. cells/ml
Material	according to requirements
Options	different automation levels
	in-line O_2 measurement
	live yeast cell monitor
	booster pump
	wort aeration

Prior to fermentation, yeast cells need to be dosed into the wort. Once the yeast cells have consumed all oxygen for reproduction, the fermentation starts.

- Homogeneous spread of yeast into wort
- Wort and yeast are blended together in a specifically designed mixing nozzle
- Process control by highly precise turbidity measurement before and after yeast dosing
- Optionally, in-line live cell measurement can be used to control the process
- During fermentation the yeast converts sugars into alcohol and carbon dioxide

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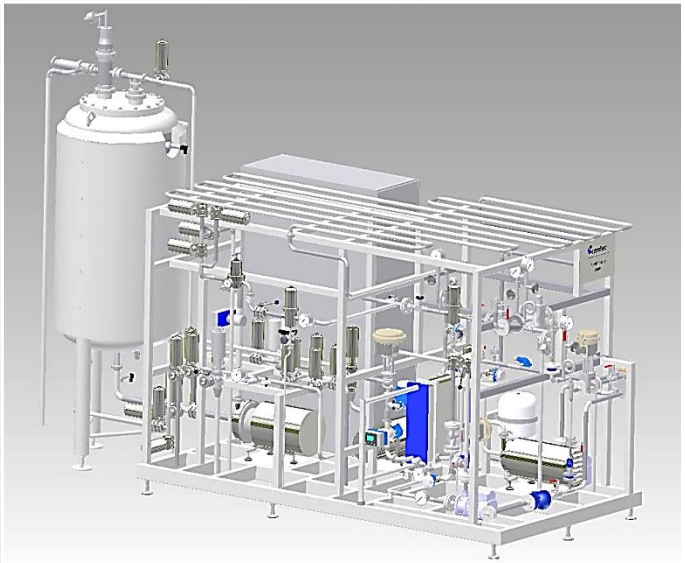
Yeast Thermolizer: Inactivation of Yeast



Capacity	10 - 1.000 hl/h
Material	according to requirements
Options	different automation levels
	heat recovery section
	booster pump
	cooling

The Yeast Thermolizer deactivates live yeast by heat treatment (pasteurization), so it can be safely disposed or used e. g. as food supplement or animal feed.

- A plate heat exchanger is used for heating
- Typically, 10 seconds at 75 °C is sufficient to rupture the membranes of the cells
- In a two-stage process, live yeast cells are first heated by flowing in counter current to the already deactivated hot yeast
- In the second step, the yeast is brought to the actual deactivation temperature by a heating medium like hot water or steam

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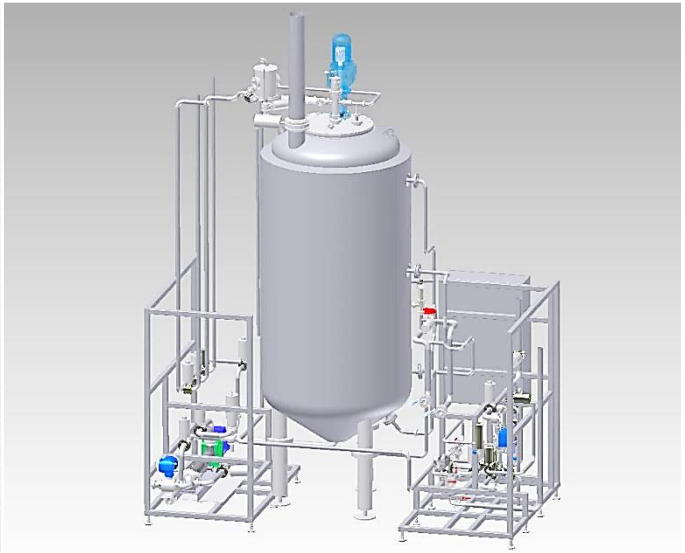
Yeast Propagator: Propagation of Yeast



Capacity	10 - 1.000 hl/h per vessel
Material	according to requirements
Options	different automation levels
	electropolished surfaces
	in-line O_2 measurement
	live yeast cell monitor
	wort sterilization

The purpose of yeast management is to maximize yeast viability and yeast vitality. Sterile conditions for the yeast are crucial throughout the entire process.

- Consisting of one or more individually controllable vessels (propagators)
- The yeast suspension is filled into the first vessel and mixed with fresh wort
- Inside the propagator the yeast cells can grow in optimum, sterile environment
- For aeration oxygen or sterile air is used
- The yeast cells are then pitched into the wort or transferred to the next vessel

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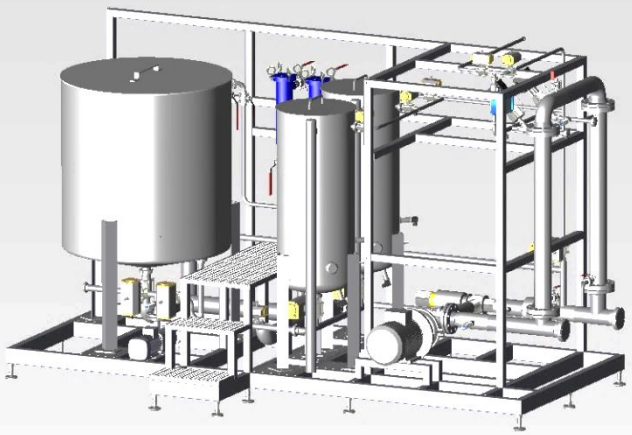
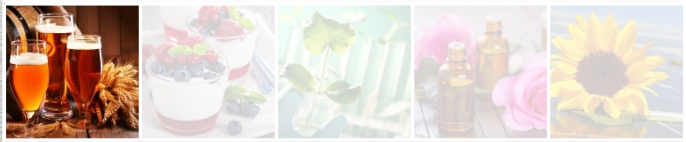
Yeast Recycler: Recovery of Beer from Yeast





Capacity	50 - 1.000 hl/h
Material	according to requirements
Options	different automation levels
	in-line O_2 measurement
	turbidity measurement
	original gravity measurement
	blending

The aim of beer recovery is to recover beer from waste or surplus yeast. The beer is returned back to the brewing process; the yeast can be sold.

- Beer recovery is based on proven cross-flow technology with robust ceramic membranes
- The recovered filtrate is free of yeast and takes up just a minimum of oxygen
- Recovered beer can be blended back into the brewing process at a ratio of up to 5 % without negatively influencing the quality and taste of the finished product
- Easy installation into the existing process

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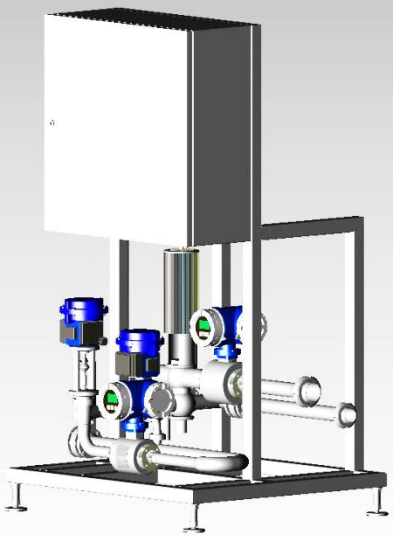
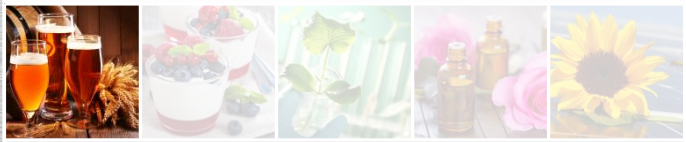
Blender: High Gravity Blending (HGB)





Capacity	2 - 2.000 hl/h
Material	according to requirements
Options	different automation levels in-line measurement of e. g. O_2/CO_2 /extract/alcohol carbonation/nitrogenation pasteurization buffer tank

High Gravity Blending allows producing different beers (brands) from one "mother beer". Brewery productivity is thereby maximized for given capacity.

- Wort with higher extract content leads to beer with higher alcohol content
- Later in the process, high gravity beer is blended with deaerated water to reach the alcohol content desired in the final product
- If this is done directly in front of the filler, brewery flexibility is increased significantly
- High precision flow meters and in-line sensors are used for process control

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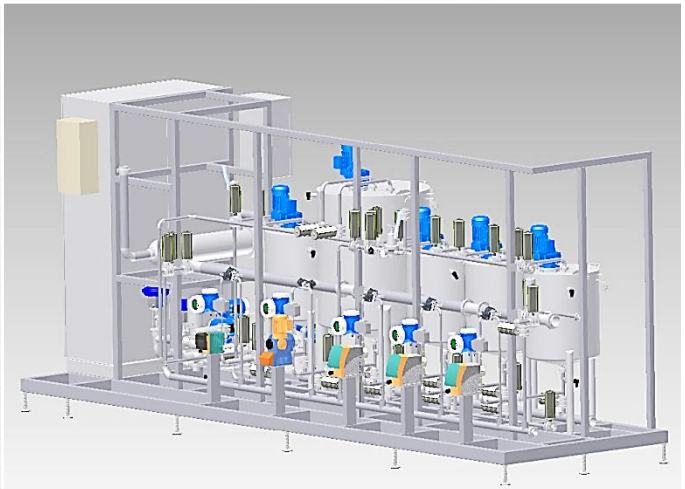
ADoS: Additive Dosing



Capacity	10 - 1.500 hl/h (1 - 150 m^3/h)
Material	according to requirements
Options	different automation levels in-line measurement of e. g. O_2/CO_2 /extract/alcohol/acid water deaeration carbonation/nitrogenation pasteurization

By additive dosing ingredients such as hops extract, flavours, colours, vitamins, enzymes or chemicals are dosed directly into the main product stream.

- Dosing is done according to a specific recipe
- The number of ingredients to be added can be adapted to meet individual needs
- High precision flow meters and dosing pumps for most accurate process control
- All product streams are instantly and fully automatically adjusted; repeatable results and minimum product losses are achieved
- Modular design for easy expansion

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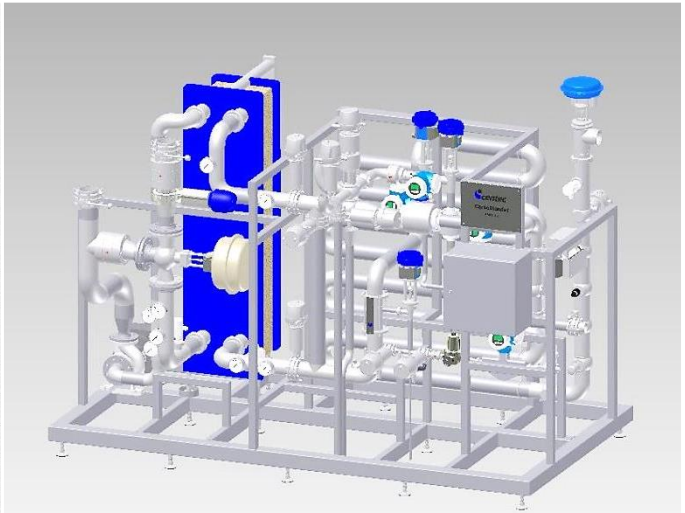
CarboBlender: High Gravity Blending & Carbonation



Capacity	2 - 2.000 hl/h
Material	according to requirements
Options	different automation levels in-line measurement of e. g. O_2/CO_2 /extract/alcohol nitrogenation pasteurization buffer tank

Carboblending combines High Gravity Blending (HGB) and carbonation in one process step. Brewery productivity is thereby maximized for given capacity.

- Wort with higher extract content leads to beer with higher alcohol content
- Later in the process, high gravity beer is blended with deaerated water to reach the alcohol content desired in the final product
- A specifically designed Vortex injector is used for adding CO_2 into the liquid stream
- High precision flow meters and in-line sensors are used for process control

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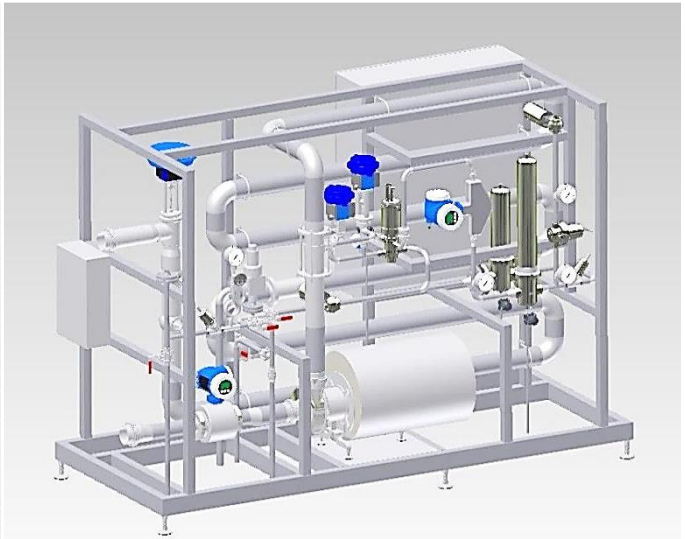
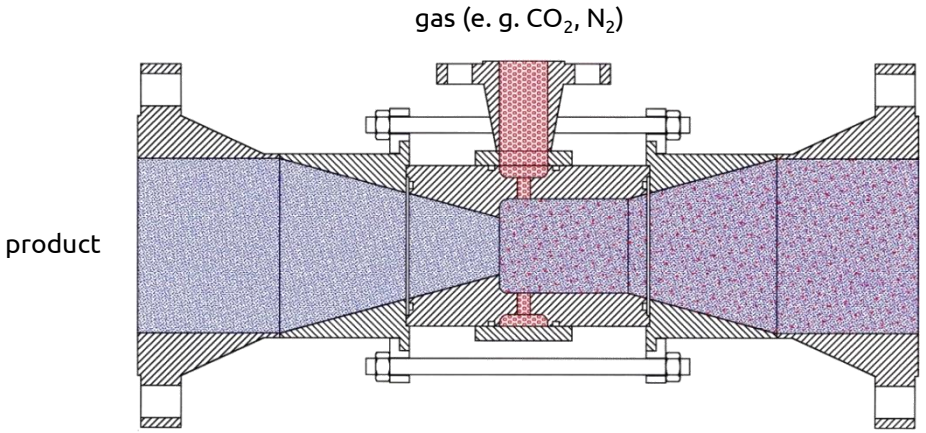
Vortex-Venturi Injector: Injection of Gases



- The nozzle is specifically designed according to the process parameters
- Gas can be injected from several direction and splits into fine bubbles
- Extremely homogeneous mixture
- Time and space for gas dissolving into the liquid are minimized

Functionality



The increase of the diameter after the injection of e.g. N_2 or CO_2 results in a reduction of the flow velocity and thus high turbulence; the turbulence splits the N_2 or CO_2 into very fine bubbles and leads to a very fast and homogeneous mixture of liquid and gas

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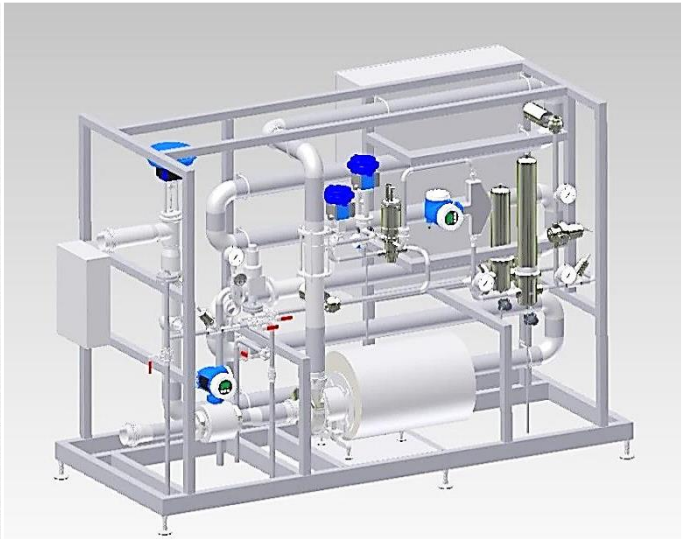
Carbonator: Carbonation



Capacity	2 - 2.000 hl/h
Range CO_2	0 - 10 g/l
Material	according to requirements
Options	different automation levels
	in-line O_2 measurement
	nitrogenation
	buffer tank
	cooling

The Carbonator is used for injection of CO_2 into liquids; carbon dioxide needs to be injected for the production of sparkling drinks and for various chemical reactions.

- Continuous carbonation of liquid products
- A specifically Vortex-Venturi injector is used for adding CO_2 into the liquid stream
- Fast and homogeneous mixture resulting from fine gas bubbles and high turbulence
- Mass flows and the carbon dioxide content are permanently monitored and adjusted
- The skid contains reliable flow meters and a high precision CO_2 in-line sensor

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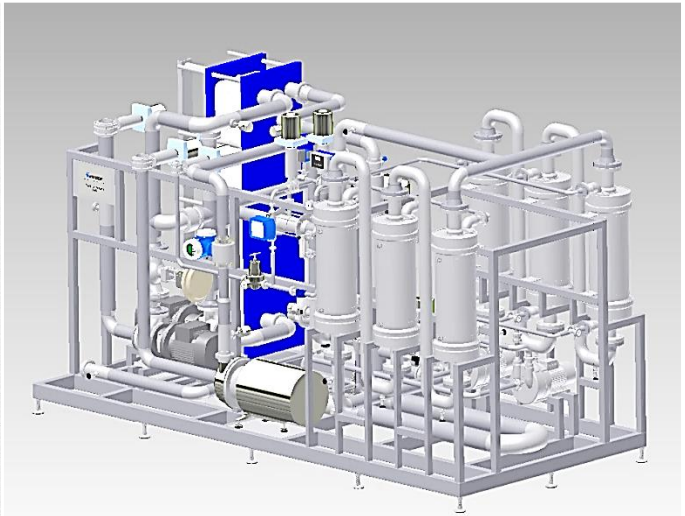
DeCarbonator: Decarbonation & Carbonation






Capacity	20 - 2.000 hl/h
Range CO_2	0 - 10 g/l
Material	according to requirements
Options	different automation levels
	in-line O_2 measurement
	nitrogenation
	buffer tank
	cooling

The DeCarbonator is used for adjustment and especially for reduction of CO_2 content in liquids; applications are found in various industries.

- Very compact skid equipped with highly effective hollow fibre membrane modules
- Product flows along the outer side of the membranes; through their inner side and in counter current passes carbon dioxide
- Depending on the CO_2 partial pressure difference, CO_2 passes the membranes either out of the product or into it
- High precision CO_2 measurement

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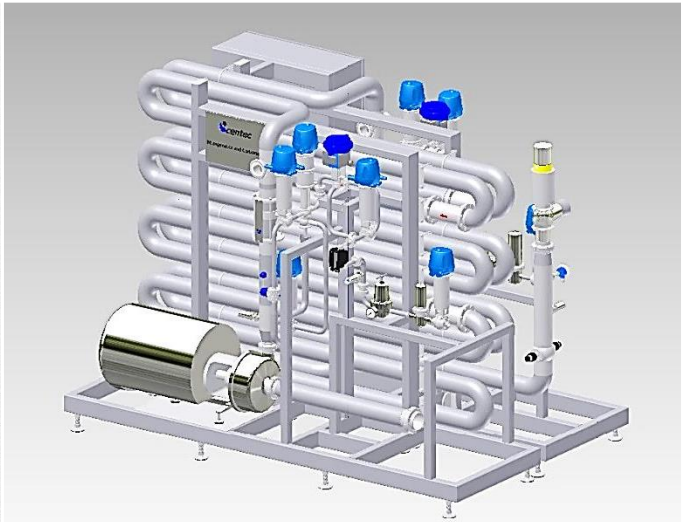
Nitrogenator: Nitrogenation



Capacity	5 - 1.500 hl/h
Range N_2	5 - 60 ppm
Material	according to requirements
Options	different automation levels
	in-line N_2 measurement
	carbonation
	buffer tank
	cooling

The Nitrogenator is used for injection of N_2 into liquids; N_2 needs to be injected e. g. to improve foam stability of beer or for various chemical reactions.

- Continuous nitrogenation of liquid products
- A specifically Vortex-Venturi injector is used for adding N_2 into the liquid stream
- Fast and homogeneous mixture resulting from fine gas bubbles and high turbulence
- Based on high precision flow measurement, the product steam and the nitrogen flow are instantly and fully automatically adjusted
- Optionally, a N_2 sensor can be integrated

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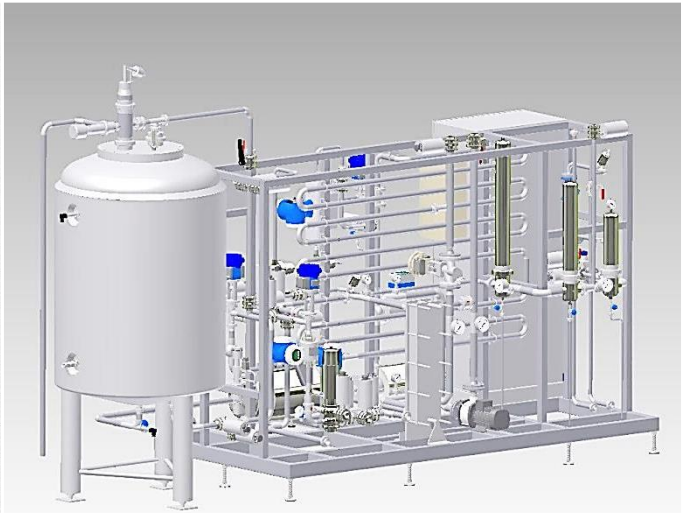
MultiMixer: Multi Component Mixing



Capacity	10 - 1.500 hl/h (1 - 150 m^3/h)
Material	according to requirements
Options	different automation levels in-line measurement of e. g. O_2/CO_2 /extract/alcohol/acid water deaeration carbonation/nitrogenation pasteurization

By continuous mixing of two or more streams, a high degree of flexibility in manufacturing can be reached; applicable to mix beer and syrup or water and acid.

- Mixing is done according to a specific recipe
- High precision flow meters and in-line sensors for most accurate process control
- All product streams are instantly and fully automatically adjusted; repeatable results and minimum product losses are achieved
- When installed in beverage industries, the system is often used also for carbonation
- Modular design for easy expansion

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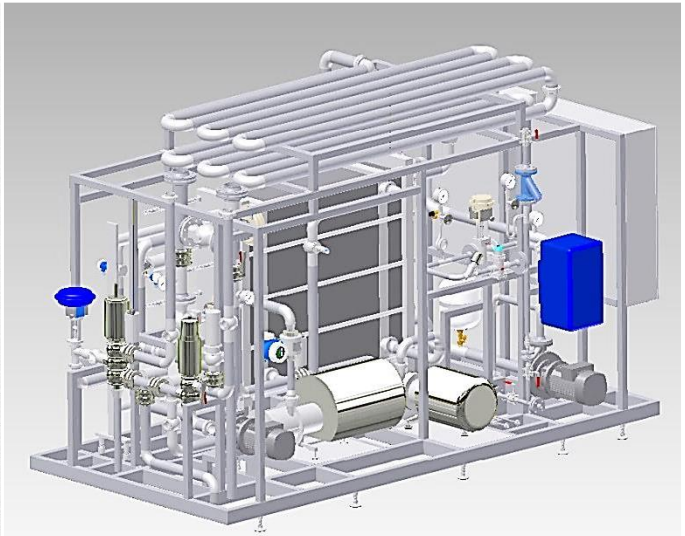
FlashPasto: Flash Pasteurization



Capacity	5 - 1.000 hl/h (1 - 100 m^3/h)
Material	according to requirements
Options	different automation levels
	booster pump
	buffer tank
	cooling

Flash pasteurization is a heat treatment method that reduces the number of harmful microorganisms in the product with the aim of improving its shelf life.

- Gentle pasteurization without adversely affecting colour, taste and digestibility
- Pasteurization time and temperature are adjusted to specific microorganisms, type of packaging and anticipated shelf life
- For optimum energy efficiency, the product is first heated by already hot product and after that by the actual heating medium
- With buffer tank in front of the filler

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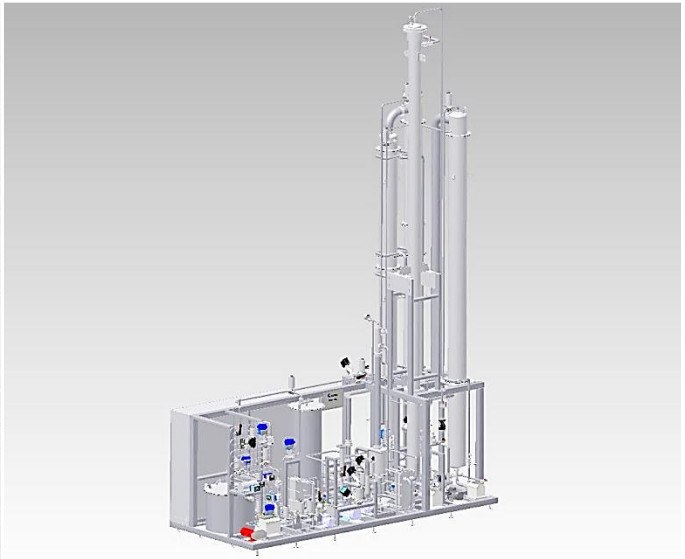
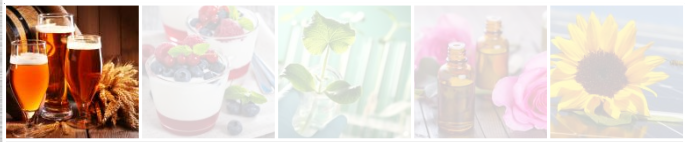
DeAlcoTec: Dealcoholization





Capacity	4 - 200 hl/h (1 - 20 m^3/h)
Residual Alc.	0,01 - 0,4 vol. %
Material	according to requirements
Options	in-line measurement of e. g. O_2/CO_2/alcohol
	carbonation
	aroma recovery
	blending
	alcohol rectification

DeAlcoTec applies an aroma conserving method to remove alcohol from beer or wine at low temperature and low pressure and after complete fermentation.

- After gentle pre-heating, the product runs top down an evaporation column
- Exhaust vapors flowing in counter current to the product remove the alcohol
- The vapors can be concentrated to form sellable liquid alcohol of up to 90 vol. %
- For aroma recovery, aroma components are extracted from the vapors and added back to the dealcoholized product

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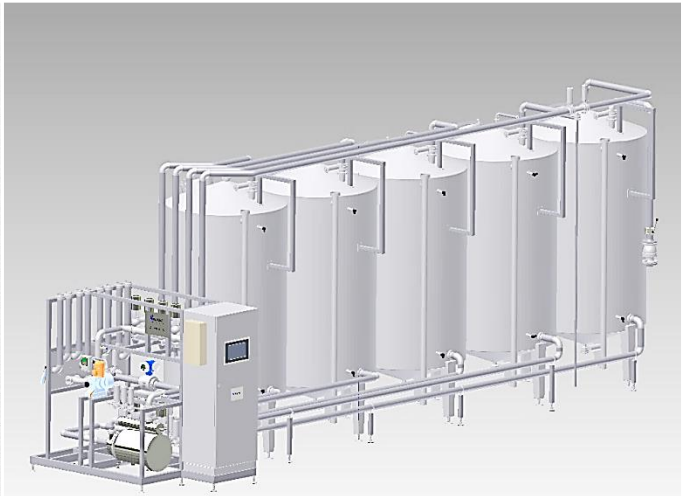
CIP: Cleaning-in-Place



Capacity	according to requirements
Material	according to requirements
Options	different automation levels
	double seat valve technology
	water purification
	CIP storage tanks
	tank insulation

The purpose of Cleaning-in-Place (CIP) is to remove product residues and microorganisms from all wetted surfaces inside pipes, tanks and filling machines.

- Cleaning has to be performed in cycles and periodically at appropriate intervals
- Temperatures, flow rates and cleaning times are perfectly adapted to the dimensions of the system and the specific cleaning tasks
- CIP skids can be small and mobile or large and stationary with tanks for CIP media
- Centec offer cold and hot concepts with minimum energy and media consumption

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SIP: Sterilization-in-Place

Capacity	according to requirements
Material	according to requirements
Options	different automation levels
	double seat valve technology
	water purification
	pure steam generation
	storage tanks

Where more stringent hygienic standards apply, sterilization is done after CIP cleaning. SIP kills harmful microorganisms that have survived CIP.

- Sterilization has to be performed in cycles and periodically at appropriate intervals
- For the SIP process, hot water, pure steam or chemical disinfectants can be used
- Pure steam generators designed by Centec are ideally suited for pure steam generation
- Centec sterilization concepts stand for very low consumption of energy, water, pure steam and chemical disinfectants

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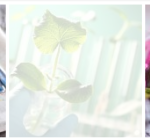
Tank






Diameter	200 - 2.500 mm
Height	max. 5.500 mm
Wall	3 - 8 mm thickness
Material	according to requirements
Options	measurement of e. g. pH, pressure, temperature, O_2
	tank insulation
	homogenizer
	agitator

Centec manufacture a variety of different tanks: CIP tanks, dosing tanks, deaerated water tanks, buffer and storage tanks, preparation vessels.

- Highest production standards, carefully selected materials, precise manufacturing
- Temperatures and pressures inside the tanks are controlled within narrow limits
- Large range of options available for tanks
- Single and double wall tank designs possible
- Pressure tanks can be manufactured
- Tanks designed and manufactured by Centec provide excellent cleaning characteristics

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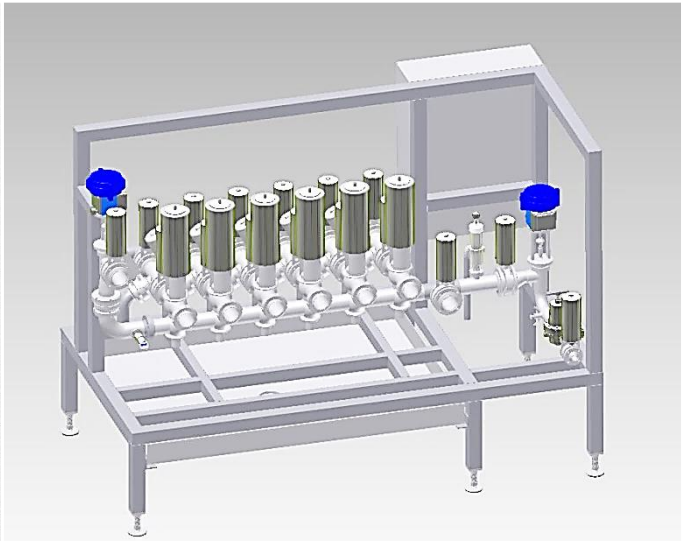
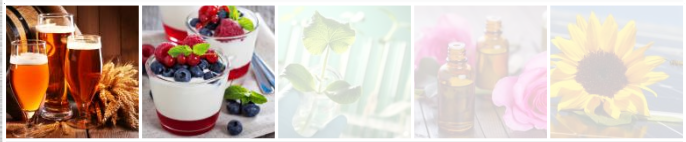
Unipressure System





Capacity	according to requirements
Material	according to requirements
Options	different automation levels
	in-line measurement of critical parameters
	double seat valve technology
	sterile gas filter

The Unipressure System is used to accurately measure and control the pressure in one or more tanks as required for maintaining consistent product quality.

- Compact, prefabricated assembly
- The skid controls the supply of gases and CIP media into the tanks through the tank tops
- For sterile applications with sterile gas filter
- Double seat valve technology prevent the intermixing of products and cleaning media
- Typically, the skid is used for storage tanks, pressure tanks, fermentation vessels and deaerated water tanks

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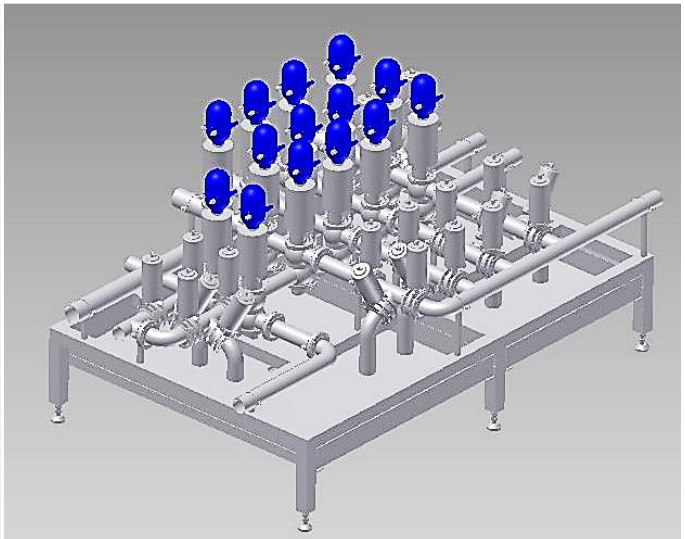
Valve Block



Capacity	according to requirements
Material	according to requirements
Options	different automation levels
	in-line measurement of critical parameters
	double seat valve technology

Valve blocks are used for distribution and regulation of liquids such as water, product, and CIP media. Centec has profound expertise in valve block engineering.

- Compact, prefabricated assembly
- Fully automated and designed to suit each customer’s specific requirements e. g. by specific dimensions or adjustable feet
- Orbital welding for optimum cleanliness
- Double seat valve technology prevent the intermixing of products and cleaning media
- In addition to new valve blocks, Centec can modify existing valve manifolds

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Thank You for Your Attention

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