Pilot plant processing, bakery and brewery equipment and facilities

www.campdenbri.co.uk/services/pilot-plant-facilities.php
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At Campden BRI we have a huge range of food and drink pilot plant facilities, covering over 3000m², to help you develop new products, analyse existing processes, and evaluate ideas for the future. This illustrated list shows some of the equipment available. Our key areas are listed below but this is not an exhaustive list: We also have a specifically designed Microbiology Process Hall.

**Sample and ingredient preparation**
Facilities to cover a wide range of products including:
- Equipment for peeling and blanching and range of fruits and vegetables
- Meat processing and preparation equipment including sausage fillers and meat slicers
- Mixers, blenders, homogenisers for products such as soups and sauces

**Thermal technologies, chilling and freezing**
Campden BRI has nearly 100 years of experience in dealing with all aspects of heat processed foods. We have facilities to help you process your products;
- Thermal processing equipment including retorts (steam, steam/air, water immersion, raining water) and pasteurisation tanks for processing under a range of conditions and to cover a wide range of product areas including canned products, pouches, trays, etc.
- Steam–jacketed pans, batch pressure cooking and cooling vessels suitable for the manufacture of ketchups, jams, sauces and ready meal mixes
- Hot air and freeze driers for preparation of ingredients for dried mixes or lab samples
- Air blast chillers and freezers for ready meals as well as fruits and vegetables

Once your products and processes are designed we can offer support with cooking instructions and process validation.

**Baking and milling**
Information to be published shortly

**Beverages**
In addition to equipment for preparing ingredients for a wide range of drinks including soft, fruit based and carbonated, flavoured beverages we have facilities for packing and processing drinks. Facilities include:

- Specialist pilot plant facilities for brewing and malting
- Drinks carbonators and a citrus multi–juicer
• HTST/UHT unit with tubular and plate heat exchanger capabilities
• Riddling and tirage bottling for wine

Emerging technologies

• New technologies such as high–pressure processing, pulsed light, UV–C light, power ultrasound, cold plasma and Revtech.

Packaging technologies

We have a wide range of packaging equipment packing into a range of materials including cans, glass, pouches and trays. We also have equipment to vacuum and modified atmosphere pack products.

Campden BRI has a range of packaging analysis including strength and integrity testing facilities and both chemical and sensory taint analysis capabilities.

In addition to this we have a range of temperature controlled rooms for storage in a variety of conditions. We also have dedicated a product development lab for recipe development including a range of kitchen–scale equipment, microwaves and conventional ovens.

We also have equipment to measure a range of quality control parameters.

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Examples of the types of products that can be produced

(Illustrative only – not exhaustive)

• In-pack heat pasteurised and sterilised foods in glass, flexible packaging and cans e.g. ready meals, soups, sauces, drinks, canned fruit or vegetables
• Carbonated and non-carbonated soft drinks including freshly squeezed juices
• Comminuted meat products such as sausages, meat pies, re-formed cooked meats.
• Non-thermal in-pack pasteurised products (using high pressure processing)
• Mayonnaise type products
• Freeze dried fruit and vegetables
• Modified atmosphere packed products such as fresh-cut fruit and vegetables
• Blast frozen products e.g. fruit and vegetables, chips etc
• Fried non-extruded snack products such as crisps
• Batch-made soups and sauces (a few litres up to several hundred litres)

In addition to the facilities outlined above we have a dedicated pilot plant facility for bakery products which includes:

• Pilot scale bread, pastry, biscuit, cake and snack production facilities
• Z-blade, Spiral, Tweedy and Artofex mixers
• Range of moulding options for bread, pastry and biscuits
• Proving cabinets, reel, rack and travelling ovens

At our Nutfield site we have a dedicated pilot facility for malting and beer production.

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Pilot plant facilities

Canning and retorting

Carnaud-Metalbox MB6 can seamers x 2

Able to close 73 x 51mm and 83 x 114mm cans but can be adjusted to close other can sizes. Both seamers have steam flow close capability. Change parts are available to allow the handling of 73mm diameter two piece cans. Closing speed of 40 cans per minute.

AID SVG can seamer x 2

May be adjusted to close cans of 65, 73, 83, 99 and 153mm diameter. Has vacuum close ability. Closing speed of 4 cans per minute.

Carnaud Metalbox MB1A can seamers x 3

May be adjusted to seam all heights of can of the following diameters: 65, 73, 83, 99 and 153mm. The maximum closing speed is 5 cans per minute.

AID PAK beverage can seamer

With Under Cover Gassing, B64 and CDL profile chucks

May be used to vacuum close double seam cans with diameters of 65, 73, 83 and 99mm. Closing speed of 3 cans per minute, up to 25 in Hg may be applied.

Carnaud Metalbox MB1A vacuum can seamer

Change parts for slim line (200) and sleek (202) formats as well as 206 diameter cans.
Can seam evaluation equipment

**CMC Kuhnke seam imaging equipment**

Windows based imaging software with inputs from Mitoyo countersink gauge, seam thickness gauge and plate thickness gauge.

**Micrometers and gauges** for the measurement of double seams.

**CMC Kuhnke seam stripper**

For removing seams from 73mm diameter food cans

**CMC Kuhnke seam saw**

For sectioning a double seam prior to image analysis

**Carnaud Metalbox MB200 vapour vacuum capper**

For applying regular twist-off (RTO) and push on-twist off (PTO) closures. Change parts for 53, 63, 68 and 70mm diameter RTO closures are available. There is a steam flow closure facility and a closing speed of 3 jars per minute.
Bead vertical 3 crate retort
May be used as a steam or water immersion retort. Working pressure of 30 psig.

John Fraser 2 vessel horizontal retort
May be used for static or rotary processing, using steam, steam/air mixture or water immersion as the heating medium. Has a facility for the attachment of a slip-ring assembly. The retort has a glass viewing panel and light system permitting viewing of containers during processing. Capacity up to 100 73 x 115mm cans, also suitable for pouches, glass jars and plastic containers. Working pressure of 3 bar.

Jon Fraser horizontal laboratory retort
Pilot scale retort may be used for steam processing in the static, axial or end over end rotation modes. Has a facility for the attachment of a slip-ring assembly.
Capacity up to 12 73x115mm cans. Working pressure of 1.4 bar.

FlexEJ laboratory vertical retort
May be used for static steam processing. Working pressure of 2.0 bar.
Capacity up to 250 73 x 61mm cans
Capacity up to 125 73x110mm cans
FMC retort

Reel and Spiral hydrostat simulator. May be used for steam or full water immersion processing. Takes a full range of cans up to A10 size will take up 47 UT cans. Has a slip ring assembly; maximum temperature 130°C.

Lagarde retort

May be used for static or rotary processing using steam/air or raining water as the heating medium. The retort is fully programmable. There is a glass viewing panel and light. There are facilities for the attachment of a slip-ring assembly. Capacity of up to 80 73 x 115 cans. Also suitable for pouches, glass jars and plastic containers. Working pressure of 6 bar.

Shaka retort

Experimental retort with novel shaking movement for improved heat penetration. Mainly suitable for cans processed in steam.

Steriflow retort

This retort is capable of processing up to 135 ET cans in a raining water process, under rotating or static conditions. The retort can operate up to 150°C, 5 Bar and 3rpm.

Fruit pasteurisation and exhaust tanks

Two atmospheric tanks for the exhausting of cans prior to seaming or for the pasteurisation of fruit packs. Capacity of up to 50 73 x 115mm cans per tank. One tank is fitted with a programmable controller.
Comminuting equipment

Robot Coupe food processor R501

Products may be sliced, diced or chipped from a continuous feed. Also allows liquidising on a batch basis.

Mainca bowl chopper

Small scale bowl chopper with adjustable bowl and blade speed settings. Maximum capacity of approximately 15kg.

Mado bowl chopper

50L capacity bowl chopper, with adjustable blade revolutions and bowl rotations.

Mincer

Electrically operated laboratory scale meat mincer.

Fryma colloidal mill

Continuous system with a variable gap size. Coarse or colloidal milling available.
Mixers

Small Mainca mixer
Two-direction batch mixer with two rotating paddles. Capacity of 30 litres.

Large Mainca mixer
Two-direction batch mixer with three rotating paddles. Capacity of 100 litres.

Silverson bench mixer
Small capacity, variable speed mixer. Three separate sized heads are available.
**Silverson mixer**
Industrial size large capacity high shear mixer. Single speed with 3 separate sized heads available.

**IKA Turbotron Type RKG paddle mixer**
Approximate speeds 20 to 1200 per min.

**Crypto Peerless EF20 mixer**
Approximately 10Kg capacity. Variable speed mixing. Dough hook, balloon whisk and K beaters available.
Homogenisers

Niro Soavi Spa Type NS2002H homogeniser

Bench scale 2 stage homogeniser – approximate capacity 50 litres per hour. Maximum pressure 600 bar.

Fruit and vegetable processing

Steam jacketed pans

From 10 to 120 litre capacities, some of which have purpose designed blanching baskets and attachment points for mixers. (Forward tipping design)

Winkworth steam jacketed pan

200litre capacity jacketed vessel – with integral agitator (bottom outlet)

Green bean cutter

Commercial sized rotating hopper continuous unit, can cut beans into 12.5mm or 25mm lengths.
Crypto-Peerless carborundum peeler
Catering sized carborundum peeler for root vegetables.

Ditto-Electrolux TRS food processor
Fruit and vegetable products may be sliced, diced or chipped. A wide range of cutting plates is available.

Brierley Collier Hartley fruit press
Manually operated laboratory scale fruit press.

Bertuzzi fruit mill and hydraulic press
Pilot scale system for the manufacture of fruit juices. Requires fruit quantities of approximately 10 Kg and upwards.
Bertuzzi pulping plant

Pilot scale system for pulping and screening of fruits to remove skins and seeds. Requires fruit quantities of approximately 10 Kg and upwards.

FMC multi juicer

The FMC Citrus juicer is a catering/semi-commercial sized citrus juice extractor. Handling fruit sizes ranging from grapefruit to tangerines.

Centrifuging and filtering

Westfalia centrifugal separator

Floor standing bench scale centrifugal separator. Processing capacity range from ~ 70litres to 4000L/hour.

Carlsson plate filter

Frame plate filter, plate size 20cm x 20cm.
**Meat processing**

**Sausage filler**

Motor driven with various nozzle sizes available. Maximum capacity of approximately 15 litres. Portioner attachment to allow for depositing consistent portion sizes.

**Vacuum tumbler**

Henneken Vacuum tumbler has a 50-litre capacity (however only fill between 10-20 litres). Manual and automatic vacuum settings. The vacuum function allows for infusion of marinades and seasonings into meat products.

**Bizerba meat slicer**

Catering sized adjustable width slicer.

**Small-scale mincer**

Electrically operated laboratory scale meat mincer.
Mincer
There are plates available that are either 5mm or 10mm depending on how finely minced the meat is required to be.

Large and small sausage filler (left)
Casing clipper (right)

Emerging technologies

High pressure processing vessel
EPSI batch high pressure processing vessel, 70mm diameter, 200mm length. Maximum working pressure 700 MPa (7000 bar). Maximum operating temperature 90°C. Pack temperature during processing can be recorded.

(Note in microbiology for non-food applications)

Ultrasound
A 2-kilowatt ultrasonic processor for industrial applications with continuous and batch mode options. The system is fully PC-controllable and is an ideal research tool for the investigation of techniques such as ultrasonic cell disruption, emulsification and homogenisation.

Dynowave- AMT 4
A trial device which makes use of microwave energy to rapidly heat all kinds of pumpable non-flammable products. This kind of heating differs from conventional heating, as the microwave energy is supplied on a molecular level. The Microwave Volumetric Heating (MVH) makes use of polarity of compounds which are present in the fluids as well as permanently change ions to cause frictional heat by means of an oscillating electric field.
The Dynowave – AMT 4 consists of a stainless-steel cabinet, which is divided into the electrical and processing cabinet. The peripherals of the device are mainly consisted of the product pump, a stirrer, a chiller, a vessel with mixer, measuring devices and valves. The materials used are all stainless steel or food grade coated (Teflon). The AMT 4 has a heating power of up to 8 kW. Typical flow rates of between 70 - 200 l/hr can be achieved.

**Revtech**

A continuous flow system for pasteurisation, roasting, controlled heating and wetting of low water activity products. Applications include the pasteurisation and/or roasting of nuts & seeds.

**Electrode panels**

Electrode panels cover a treatment area ~0.45 m² and can be adjusted up to 30 cm from the conveyor belt to allow the treatment of a variety of different sized food products as well as the conveyor material.

**Continuous cold plasma system**

Prototype plasma system suitable for feasibility studies with food or food contact materials. Plasma is generated on the surface of the electrode panels using the surrounding air and is an indirect treatment.

**Ultraviolet light decontamination tunnel**

System suitable to accommodate a variety of products (50mm to 250mm). The system consists 16 x 95W 'high output' UV-C emitters, where the product can be treated from both above and below.
Packaging equipment

**Multivac C200**

Chamber units for the vacuum/gas flush sealing of pouches of maximum width of 465mm. The sealers have a top and bottom heating element. The level of vacuum is adjustable. Closing speed up to 6 pouches per minute.

**Fords Duckworth 003 bench heat sealer**

Atmospheric heat sealer for pots with a maximum diameter of 75mm.

**Proseal tray sealer**

**Hulme-Martin hand operated bench impulse sealers**

Various sizes and types of bag/pouch may be sealed. Maximum bag size of 320mm.
**Riverside hot bar sealer**

Time, temperature and pressure control for sealing

**Hulme Martin hot bar sealer**

Produces a crimp seal. Temperature control for sealing.

**Schreiner creep/burst test system**

Equipment for the determination of seal strength and seal integrity of sealed flexible and semi-rigid packages

**Witt Pack Vac leak detector**

Leak detection equipment using vacuum under water to test for leaks in flexible and semi-rigid packs.

**Systech Gaspace advance gas analyser**

Equipment for measuring the headspace gas of flexible and semi-rigid containers. Measures oxygen, carbon dioxide and balance gas (measured as nitrogen) levels. Programmable sampling times and levels are also possible.

We now have an attachment enabling the analyser to be used on metal cans.

**Systech permeability equipment**

Equipment for measuring the oxygen transmission rate and water vapour transmission rate of packaging materials
Environmental chamber

Ideal for use with the Systech permeation analysers. Enabling testing of films, packages and bottles under different temperature and humidity conditions. Temperature range +5 °C - +85°C. Humidity range 40% - 95% RH.

Zwick/Roell Z050

Multi-functional machine which can perform a number of different tests including the tensile and bond strength of seals, compression and edge crush testing of primary and tertiary packages, mullen burst test and peel testing. Can also conduct coefficient of friction testing on plastic films and sheets.

Internal pressure tester

Used to determine the amount of pressure a bottle or container can withstand without bursting or deforming.

Glove box

Chamber which can contain a controlled gaseous atmosphere (e.g. Nitrogen), the use of attached rubber gloves allows the filling and sealing of product and packaging within the controlled atmosphere. Equipment also contains a portal to transfer product and equipment in and out of the chamber as required without displacing the controlled atmosphere.
Texture and food structure assessment

Through the use of a master and slave, Campden BRI offers a standardisation service to pea tenderometer users

Dodman digital pea tenderometer

Electronic version of the Martin pea tenderometer with digital readout.

Martin pea tenderometer

Now used as the Campden Sub-Master Tenderometer.

Data acquisition systems

Squirrel data loggers

Anville data loggers

Ellab TM 9616 and flex systems

Ellab tracksense reader stations
Ellab Tracksense wireless loggers (various types)

Anemometer
Biral hot wire model. Unsuit to operational temperatures greater than 50°C.

Flir thermal imaging camera
Infrared thermometry system capable of reading 3700 temperatures per frame. Measurements can be taken between -30 to 2000°C with an accuracy of 1°C or 1%. The camera itself can withstand environmental conditions of -15 to +55°C

Luxtron data acquisition system
Fibre optic time/temperature data logger for applications where conventional thermocouple measurement is not possible such as inside microwaves.

Soft drinks
Soft drinks carbonator- Armfield FT102X
Able to fill all sizes of cans and a wide range of PET and glass bottles. Cans can then be seamed using the AID PAK seamer. Variable carbonation settings available from 2.0 to 4.5 volumes CO₂.

35L pressurised tank with extra 100L atmospheric holding tank which pumps into pressurised chamber.
**UHT / HTST pasteuriser - Armfield FT 74XTS**

UHT throughput up to 20 litres/hour. Process temperature up to 140°C. Variable holding tube option. Tubular or plate heat exchangers option. Process parameter display and data logging to laptop computer.

**Cooking/vacuum cooling/drying**

**BCH vacuum cooker/cooler**

10-20 kg vacuum/pressure cooker. Steam jacketed with an operating pressure of up to 6 bar. The inner vessel has an optimum working pressure of 1.5 bar. The vessel is fitted with an anchor type agitator and also has a steam injection facility. The vessel is also suitable for full vacuum processing.

**Chilling and freezing equipment**

**Armfield freezer**

May be used for fluidised bed freezing and air blast freezing using horizontal or vertical air movement. In addition, blast chilling may also be performed. The air temperature required may be pre-set, fan speeds are adjustable. Lowest chamber temperature -35°C.

**Birchover freeze dryer**

Maximum 4-shelf capacity: 3 at 97cm x 37cm; 1 at 77cm x 37cm
Giusti Vesuvio cook/cool system

A 250-litre vessel with integral scraped surface agitator. Particularly suitable for cooking and vacuum cooling liquid foods. Steam injection and steam jacketed capacity. Emulsifier attachment can also be used.

Microwave and conventional ovens

3 domestic gas ovens, 3 domestic electric ovens and 3 fan assisted electric ovens for cooking instruction development. A very large selection of domestic and food service microwave ovens for instruction development purposes.

Frying equipment

Valentine “Maxi” deep fat fryer

Catering sized equipment with 15-litre oil capacity. Uses 5Kg capacity baskets.
Lincat deep fat fryer
Catering sized equipment with 15-litre oil capacity. Single basket.

Fillers
Enolmatic bottle filler
Mains operated semi-automated small-scale vacuum bottle filler. Has an adjustable filling level and speed of fill.

Other
Laminar flow cabinet
The Laminar Flow cabinet can be used to provide a clean environment for the hygienic filling of products.

Turbofill filler
Pneumatic food product filler for liquid and semi-solid foods. Filling level and speed are adjustable. Has both a continuous and manual filling operation. Manual filling via a foot paddle.
Using the laminar flow cabinet alongside the HTST machine means clean filling pasteurised drinks is possible.

VeriVide photostability cabinet

The storage cabinet can offer alternate light sources and the option to alternate between light sources and intensities. The cabinet can be sited in a temperature and humidity-controlled storage room via its fan driven ventilation system it is able to maintain the ambient temperature and humidity. Doors and walls are lined with reflector linings to reflect the light onto the samples and avoid shading.

Ancillary facilities

Nine, walk-in, controlled temperature stores programmable to temperatures in the range of -18°C to +40°C. Controlled humidity in the region of 50-90% relative humidity is available in some stores.

Product Development Kitchen, and other preparation areas including cookers, domestic blenders/processors, balances, pH meters.

Large controlled temperature rooms where process machinery can be temporarily located.
Seam evaluation room
Seam assessment kit

Calibration laboratory

Packaging laboratory

Dry laboratory
Bakery pilot plant equipment

Spiral mixer

Designed to develop consistent dough in atmospheric conditions, with limited friction heat, and oxidation. A range of spiral mixer sizes are available from a dough capacity of 2-70kg.

High speed Tweedy mixer

Three high speed mixers are available for the Chorleywood bread process. These run at 300rpm and take a range of dough weights.
- Tweedy 10 – mixes to time at atmospheric pressure
- Tweedy 35 – mixes to time at both atmospheric pressure and vacuum conditions
- Tweedy 70 – mixes to energy input and had both pressure and vacuum capabilities.

Z blade mixer

Both standard and PC controlled z-blade mixers are available. Standard mixers can be used for biscuit dough, or similar short dough, and PC controlled mixers are set to energy input, often used for small scale bread trials.

Planetary mixer

A range of sizes are available, using a variety of attachments for different products. This includes dough hooks, cake batter paddles, and whisks.
Reel oven

Three-reel ovens are available, suitable for a variety of baked products, rotating at a range of speeds. These are all gas powered - the larger ovens often used for pan bread, and the smaller ovens used for cakes.

Deck oven

Two deck ovens are available, one located in the pilot plant bakery facility. Both ovens have steam injection.

Rack oven

Two rotating rack ovens are available, with air flow systems, to ensure even baking. These also have a steam injection option.

Travelling oven

A small scale, two chamber travelling oven. This has four simmer stat setting options, as well as steam injection. Side windows enable you to observe the entire baking process, with a maximum bake time of 23 minutes.

Provers/ retarders

A selection of provers, with and without retarding facilities, are available. These can all regulate temperature and relative humidity. The Acrivan prover contains inbuilt shelving with Perspex windows allowing observation during proving. Other provers contain space for racks, making them suitable for a higher volume of product.
Conical moulder

Fixed moulder, suitable for rounding before and after intermediate proof.

Final moulder

This moulder contains a sheeter, roller and pressure board, with a 4 piecing option.

Baguette moulder

This small-scale moulder contains a roller and pressure board using 350g scales dough pieces.

Small scale roll plant

Our roll plant can create rolls up to 130g in weight with additional pressure boards.

Rondo Smartline

Our pilot scale Smartline has two main sections. Firstly, a hopper and dough feeder with reduction rollers. Secondly, a series of rollers and cutters with a wide range of attachments such as dockers and filling extruders.
Dough press

Pastry brake

Dough laminator

Chocolate equipment

Chocolate enrober

CAO-B5 ball mill refiner

The ball mill is a machine that is used for the grinding and homogenisation of cocoa, chocolate and similar masses. The stainless steel jacketed tank contains the grinding balls and a vertical positioned exchangeable grinding shaft with grinding arms. The equipment has a heating element. It is also possible to cool the product by supplying cold water to the jacket.
**KitchenAid mixer with a heated bowl**

KitchenAid mixer with double-wall insulated bowl is ideal for mixing and heating ingredients without overheating them, ideal for example for melting chocolate. Temperature controls on display allows precisely adjust heat from 21° to 104°C.

**Stirring tank**

A stirring tank with a heated jacket. Suitable for various products such as chocolate or sourdough ferments.

**Bakery texture equipment**

**TexVol L370 Laser volume machine**

**C-cell crumb analysis**

**Differential Scanning Calorimetry**

**Rapid visco analyser**
Bühlermill
A six-stream adjustable lab scale roller mill for the production of white flour. We have 4 MLU-202s that are calibrated for use with wheat but can be adjusted for use with other cereals or products. Minimum sample size of 2kg and an average throughput of 6kg/hour.

Dehuller
The Alvan Blanch IH15 is a high powered impact dehuller using a rotating blunt blade to crack the hulls off many cereals and legumes.
Large sieve

The Farleygreene Sievmaster is a single pass vibrating sieve chamber with a diameter of 60cm. This is used for large scale sieving and fractioning.

Kek-Gardner blender

Tumbling 8L cone blender used to homogenise samples in particular as a final step in the flour milling process.

Dockage tester

Clean and separate grain of dust, chaff and other big and small particles. Speed can be adjusted to feed and air rate, depending on the grain. Can be used for different types of grain: hard red spring, red durum, white, hard red winter, soft red winter, durum-white, rye, corn, barley, flax and grain sorghums.

Redresser

The Russell Demi Finex A14550 is a vibrating sieve chamber with a fitted 300 μm. It is used as a final purification step of white flour after roller milling to remove any large particles retained from flour finishing.

Small-coffee roaster

Ideal for the evaluation of coffees as well as training in different approaches to roasting coffee.

Variomill

A single mass roller mill used mainly for milling research with all kinds of raw materials due to its ability to adjust and modify many of the milling properties/settings.

Roll speed and differential, roll surface type, roll angle and gap can all be adjusted to create a range of different products. Used for rolling, flaking, milling many different types of cereals and legumes.
Pilot brewery equipment
(Nutfield site)

1hl Briggs pilot brewery

Plant incorporates a sequential lauter tun system with the flexibility to use mash filtration. System also incorporates a dual use wort kettle/ cereal cooker.

Meura 2001 pilot mash filter

Pilot scale mash filtration for use with a variety of raw materials including malted and unmalted grains.

Alfa Laval membrane separations rig


Haffmans inpack TPO/CO2 meter

Inpack beverage analysis, allowing differentiated measurement of headspace oxygen and dissolved oxygen. Up to 150 product types can be programmed including most cans and bottles.
Meheen carbonated beverage bottle filler

Two head, counter pressure bottle filler with pre-evacuation and long fill tubes, which allow for a calm fill and low dissolved oxygen pickup. Suitable for 275ml and 500ml bottles.