

»Does your process involve modified atmosphere packaging (MAP)?«

[FRIEDRICH HILLEBRAND: REGIONAL SALES MANAGER – WITT GASETECHNIK]

Our MAP solutions
guarantee certified safety for
your packaging process.

Keyword: HACCP



THE RIGHT MODIFIED ATMOSPHERE FOR EVERY PRODUCT

PROTECTIVE GASES

Oxygen (O₂) essentially causes food to spoil due to oxidation and forms the ideal preconditions for aerobic microorganisms to grow. As a result, oxygen is frequently excluded from modified atmosphere packaging. In some cases – typically red meat – processing is deliberately carried out with high oxygen concentrations, in order to prevent the red colour from becoming 'pale' and inhibit the growth of anaerobic organisms.

Carbon dioxide (CO₂) is colourless, odourless and tasteless. It has an oxidation-inhibiting and growth-inhibiting effect on most aerobic bacteria and moulds. The gas is frequently used to increase the shelf life of food. The shelf life of packaged or stored food is normally longer, the higher the CO₂ content. Nevertheless, many products can become sour if the dosage is too high. In addition, the gas can diffuse out of the packaging or be absorbed by the product – the packaging collapses. The use of supporting or filling gases can slow down this effect.

Nitrogen (N₂) is an inert gas and exhibits a high degree of purity, depending on the production. It is usually used for displacing air, especially atmospheric oxygen, in food packaging. This prevents the oxidation of food and inhibits the growth of aerobic microorganisms. It is frequently used as a supporting or filling gas, as it diffuses very slowly through plastic films and hence remains longer in the packaging.

Carbon monoxide (CO) is colourless, odourless and tasteless. Similar to oxygen, carbon monoxide is sometimes used to retain the red colour of, for the most part, meat. The required concentrations are very low. In some countries, including the EU, the use of carbon monoxide for modified atmospheres is nevertheless prohibited in foods.



MEAT AND SAUSAGE PRODUCTS

Product	O ₂	CO ₂	N ₂
Raw red meat	70	20–30	0–10
Raw entrails	80	20	0
Raw poultry with skin	0	30	70
Raw poultry without skin	70	20–30	0–10
Cooked meat and sausage products	0	20–30	70–80

Examples of gas mixture compositions in %

Meat and sausage products, above all raw meat, are very prone to spoiling due to microbial growth on account of their high moisture and nutrient content. No matter whether beef, pork or poultry – spoilage begins from the moment of slaughter and especially all butchering. Besides high hygiene standards and permanent cooling, modified atmospheres can significantly extend the shelf life of meat and sausage products. CO₂ is the most important among the protective gases. At concentrations above 20 %, CO₂ can considerably reduce microbial growth.

In the case of red meat, there is also the risk of oxidation of the red colour pigments. The meat will lose its red colour, becoming grey and unappetising in appearance. This oxidation is especially prominent with beef. A high oxygen content in protective gas packaging can prevent oxidation. A low carbon monoxide content (approx. 1 %) can also help to retain the red colour of meat. However, the use of gas is not allowed in the EU, for example.

Poultry is especially sensitive to rapid spoilage and is therefore subject to higher requirements for permanent cooling. Here too, a modified atmosphere with CO₂ content will extend the shelf life. A high oxygen content is also used for poultry without skin so as to retain the colour of the meat. The CO₂ can partly be absorbed by the foods. To prevent the packaging from collapsing, nitrogen is used as a supporting gas.

Sausage and meat products, e.g. marinated or smoked meat pieces, react very differently depending on the preparation. The longer shelf life from the start can also be influenced positively with protective gases. The CO₂ content should not be too high with these products, in order to prevent a sour taste.



FISH AND SEAFOOD PRODUCTS

Product	O ₂	CO ₂	N ₂
Raw low-fat fish	20-30	40-60	20-40
Raw high-fat fish	0	40	60
Shellfish and crustaceans	30	40	30
Cooked/Smoked fish	0	30-60	40-70

Examples of gas mixture compositions in %

Fish and seafood are some of the most sensitive foods. They are at risk of rapidly declining in quality and spoiling even shortly after the catch. The reason for this lies in the neutral PH value as an ideal precondition for microorganisms as well as special enzymes that negatively affect taste and odour. Fish, which is rich in fatty acids, also becomes rancid quickly.

The most important element for a longer shelf life is cooling close to 0° Celsius. Modified atmospheres with minimum 20 % CO₂ also retard the growth of bacteria. CO₂ components around 50 % are frequently used. Higher CO₂ concentrations can lead to undesirable side effects such as liquid loss or a sour taste.

In the case of low-fat fish and shellfish, O₂ is also used in the packaging. This prevents a fading or loss of the colour, while serving as a growth inhibitor for some types of bacteria at the same time.

When dealing with shellfish and crustaceans, special attention should be paid to ensuring a CO₂ content that is not too high. This can be discerned most clearly by a sour taste, while these products absorb CO₂ the most, as a result of which the packaging can collapse. Nitrogen as an inert supporting gas prevents this effect.



MILK PRODUCTS

Product	O ₂	CO ₂	N ₂
Hard cheese	0	30-100	0-70
Soft cheese	0	10-40	60-90
Sliced cheese	0	30-40	60-70
Cream cheese	0	100	0
Yoghurt	0	0-30	70-100
Milk powder	0	0-20	80-100

Examples of gas mixture compositions in %

Cheese is predominantly spoiled by microbial growth or rancidness. A continuous cooling chain essentially extends the shelf life of products. With hard cheese, there is a risk of mould formation upon contact with oxygen. As a result, vacuum packaging was frequently used in the past, even though these are awkward to open and can leave unattractive marks behind on the product at the same time. CO₂ effectively prevents mould formation, but does not otherwise affect the maturation of the cheese.

Soft cheese can quickly become rancid. This problem can also be tackled with CO₂ modified atmospheres. However, as soft cheese absorbs CO₂ to a significantly higher extent, there is a risk of the packaging collapsing. A correspondingly lower CO₂ content should therefore be chosen.

In the case of milk products such as yoghurt or cream, there is a risk of the products absorbing too much CO₂ and becoming sour. A lower CO₂ content should therefore be chosen.

Milk powder, above all for use in baby food, is a highly sensitive product. It is especially important to ensure that oxygen is displaced from the packaging in order to extend the shelf life. In practice, packaging is carried out in pure nitrogen with as low a residual oxygen content as possible.





FRUIT AND VEGETABLES

Product	O ₂	CO ₂	N ₂
Fresh fruit and vegetables	3-10	3-10	80-90
Cooked vegetables	0	30	70

Examples of gas mixture compositions in %

BREAD AND CAKE

Product	O ₂	CO ₂	N ₂
Crispy breads	0	50-100	0-50
Cakes, biscuits	0	50	50

Examples of gas mixture compositions in %

With bread, cake and biscuits, the shelf life is primarily affected by potential mould formation. A high standard of hygiene during production and packaging can significantly minimise this risk. Packaging involving a modified atmosphere with CO₂ and without oxygen extensively prevents the products from becoming mouldy and extends the shelf life. To prevent the packaging from collapsing owing to CO₂ absorption by the products, nitrogen is used as a supporting gas in many cases.

Modified atmospheres in packaging make it possible to offer consumers fresh and untreated products – in other words succulently fresh fruit and vegetables – with a long shelf life. At the same time, fruit and vegetables are subject to very special requirements in regard to the nature of the packaging and atmosphere. This is because – in contrast to other food – fruit and vegetables continue breathing after the harvest and consequently require an oxygen content in the packaging. Furthermore, the packaging film does not have to be fully tight. By taking the product's breathing and the permeability of the film, typically via micro-perforation, into account, the composition of carbon dioxide, nitrogen and low amounts of oxygen ideal for the product can be maintained. The term used here is an EMA (equilibrium modified atmosphere). The gas composition is individually adapted to the corresponding product.

Thorough cleaning along with hygienic processing are the fundamental preconditions for long-lasting freshness. Modified atmospheres, in conjunction with corresponding cooling, can be used to extend the shelf life of fresh produce, while achieving an attractive packaging design at the point of sale.





PASTA AND READY-MADE MEALS

Product	O ₂	CO ₂	N ₂
Ready-made meals	0	30-60	40-70
Pasta/Pizza	0	30-60	40-70
Sandwiches	0	30	70

Examples of gas mixture compositions in %

The nature and composition of fresh pasta and, in particular, ready-made meals are very different. Above all, multi-component products such as ready-made pizzas or sandwiches contain many different foods with differing shelf lives and spoilage properties. In the majority of cases, modified atmospheres can significantly extend the shelf life without using oxygen. Mixtures of CO₂ and nitrogen are used here. The concentration of the gases is oriented to the content of the product. If, for example, there is a risk that large volumes of CO₂ will be absorbed by the product, the nitrogen content should be chosen higher to prevent the packaging from collapsing.



VIN

Product	O ₂	CO ₂	N ₂	Ar
White wine / Rosé	0	20	80	0
White wine / Rosé	0	20	0	80
Red wine	0	0	100	0

Examples of gas mixture compositions in %

Gases or gas mixtures are often used to protect wine in the different phases of its production process and to retain the quality of the product. They are mainly used to avoid contact with oxygen and prevent microbial deterioration. The tank headspace is replaced with an inert gas or a gas mixture, for example of CO₂, N₂ or Ar. The composition of the gases is chosen according to the type of wine.



SNACKS AND NUTS

Product	O ₂	CO ₂	N ₂
Snacks/Crisps/Peanuts	0	0	100

Example of gas mixture compositions in %

Snack products, for example potato crisps or peanuts, primarily involve problems associated with the fat content of the food. There is a risk of oxidation, whereby the products can quickly become rancid if the packaging is not optimal. To extend the shelf life, it is therefore important to minimise the contact with oxygen. Modified atmospheres with 100 % nitrogen are frequently used. In this way, a premature spoilage can be prevented, while these atmospheres also provide protection from mechanical damage to sensitive products, e.g. potato crisps in conventional packets.



COFFEE

Product	O ₂	CO ₂	N ₂
Coffee	0	0	100

Example of gas mixture compositions in %

As a dried product, coffee is relatively insensitive to spoilage by microorganisms. However, the risk of the fatty acids it contains oxidising and making the product rancid is greater. To prevent this, coffee is packaged with the exclusion of oxygen. Instead, a modified atmosphere comprising pure nitrogen is frequently used in coffee sachets or capsules.

CONTROLLED QUALITY OFFERS PEACE OF MIND

This security for your packaging process is provided with WITT MAP-solutions – certified according to ISO 22000 food safety standard.

As the market leader with decades of experience, WITT offers you Gas Mixing and Metering systems, Gas Analysers, Leak Testing equipment for packages as well as Ambient Air Monitors from a single source.

Rely on German Quality and local contacts worldwide.

WITT – THE NO. 1 IN MAP

The illustration of the packaging process on the right shows where WITT products provide quality and security.

GAS MIXER AND GAS FLOW CONTROL SYSTEMS

- 1 KM-Series
- 2 MG-Series
- 3 KD 500-1A

GAS ANALYSERS

- 4 OXYBABY® O₂/CO₂
- 5 PA O₂/CO₂
- 6 MAPY O₂/CO₂/CO/N₂O/He/C₂H₄

LEAK DETECTION SYSTEMS

- 7 LEAK-MASTER® EASY
- 8 LEAK-MASTER®
- 9A LEAK-MASTER® MAPMAX (Leak detection for single packages)
- 9B LEAK-MASTER® MAPMAX (secondary packaging, e.g. cartons, E2-boxes)

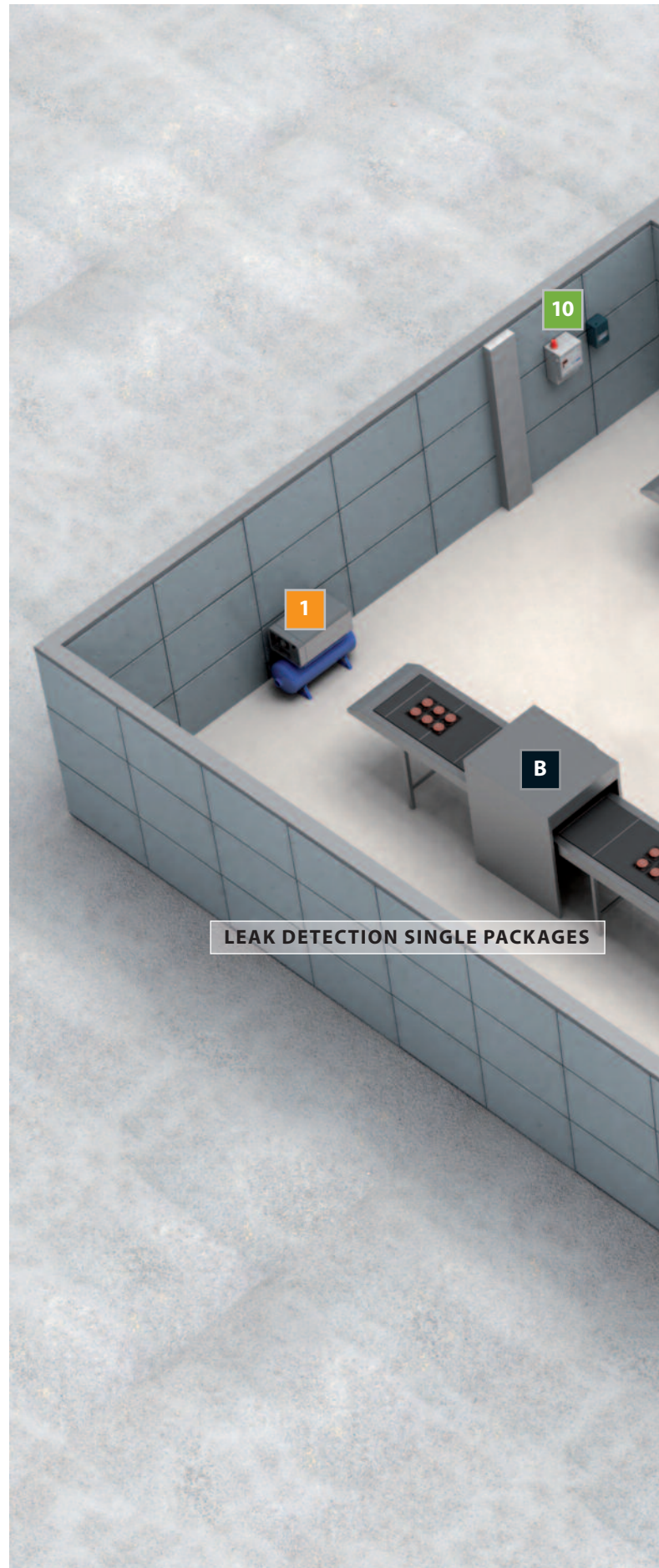
GAS MONITORING

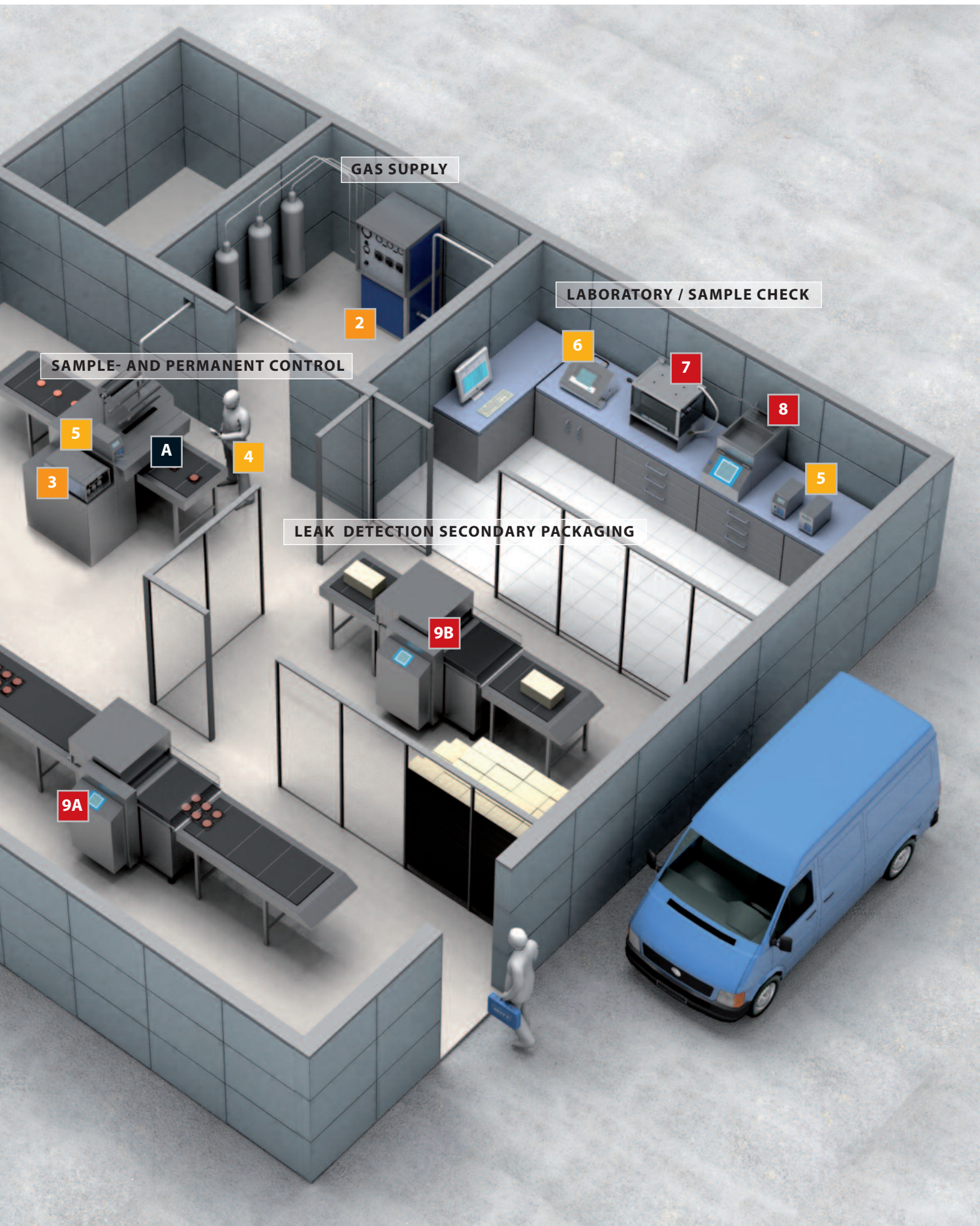
- 10 ROOM AIR MONITORING

Please find the explanation to each product and also the corresponding technical features and benefits in the chart on the following pages.

A FLOW PACK MACHINE



B VACUUM PACKAGING MACHINE









PRODUCT OVERVIEW

GAS MIXER AND GAS FLOW CONTROL SYSTEMS

PRODUCT	APPLICATION	FEATURES
<p>1 KM-Series 2 MG-Series</p> 	<p>Gas mixing systems for 2 or 3 defined gases, designed for a variety of applications, particularly for all areas with constant or varying mixed gas flow demands.</p>	<ul style="list-style-type: none"> • Infinitely variable mixture settings → • Proportional mixing valve for two gases with %-scale → • Individual mixing valves for three gases with %-scale → • Gas mixture withdrawal from zero to max flow capacity → • Integrated pressure equalization system → • Splash-proof, robust stainless steel housing →
<p>3 KD 500-1A</p> 	<p>Electronic flow control system for modified atmosphere packaging (MAP) to suit flow pack machines in the food industry and for room atmospheres e.g. for the storage of fruit and vegetables. Total control of the O₂ residual in the pack.</p>	<ul style="list-style-type: none"> • Integrated O₂ analysis → • Electronic control of gas flow to sensor → • Threshold limit control with alarm relay contacts → • Integrated pressure control → • Splash-proof and robust stainless steel housing → • Interfaces for documentation and remote transfer of settings and measured values →




GAS ANALYSERS

PRODUCT	APPLICATION	FEATURES
<p>4 OXYBABY® O₂/CO₂</p> 	<p>Cordless hand held Gas Analyser for checking modified atmosphere packs (MAP). The ideal instrument for portable, faster and accurate sample tests at the packaging machine, in stores or in laboratories.</p>	<ul style="list-style-type: none"> • Minimum sample gas requirement (approx. 2 ml) → • Fast measurement → • Ergonomic design → • Large illuminated graphic-text-display → • Integrated needle cover → • Integrated data logger → • Specific product names → • Flow Control with alarm function → • USB port → • Multilingual menu guide →
<p>5 PA O₂/CO₂</p> 	<p>Compact Gas Analyser for checking and/or monitoring modified atmosphere packs/ packaging (MAP). For continuous analysis (in-line) and also intermittent sampling via a needle at the packaging machine, in stores or in laboratories.</p>	<ul style="list-style-type: none"> • Minimum sample gas requirement → • Threshold limit control with alarm relay contacts → • Large illuminated graphic-text-display → • Zirconia sensor for O₂ measurement possible → • Integrated data logger → • Specific product names → • USB port → • Continuous analysis or sample testing → • Separate PC-software → • Multilingual menu guide →
<p>6 MAPY O₂/CO₂/CO/N₂O/He/C₂H₄</p>  <p> reddot design award winner 2009</p>	<p>Premium Multifunctional Gas Analyser for checking and/or monitoring modified atmosphere packs/package (MAP). For continuous analysis (in-line) and also intermittent sampling via a needle at the packaging machine, in stores or in laboratories.</p>	<p><i>Features see PA, plus:</i></p> <ul style="list-style-type: none"> • Large, clear colour touch screen → • User management for up to 60 users → • Administration of up to 1000 products → • Auto run of the sample hold measurement → • Data transfer via USB-stick or Ethernet connection → • Flow Control with alarm function → • Automatic checking → • Pressure compensation → • Electrochemical, Zirconia or Paramagnetic sensor for O₂ →


YOUR BENEFITS	OPTIONS
<ul style="list-style-type: none"> → Always the correct gas mixture → Easy mixture adjustment without any complicated calculation → All-purpose for large and small packages → Protection against pressure fluctuations in the gas supply → Easy to clean and hygienic 	<ul style="list-style-type: none"> • Gas supply monitoring • Integrated analysis • Mixer mounted on a buffer tank • For flammable gases available as EEx-version with separate control cabinet • Remote control
<ul style="list-style-type: none"> → Reliability by permanent control of the O₂ concentration → Optimal process reliability by self-control → Direct alarm reaction avoids defective goods (by stopping the packaging machine) → Protection against pressure fluctuations in the gas supply → Easy to clean and hygienic → Customer-oriented quality documentation 	<ul style="list-style-type: none"> • GAS CONTROL CENTRE Software for data processing • Integrated printer for data documentation • Separate printer for data documentation • Zirconia sensor for O₂ measurement
YOUR BENEFITS	OPTIONS
<ul style="list-style-type: none"> → Ideal instrument for all pack sizes → Result after max. 6 seconds → Genuine one hand operation, plug and play → Easy to read. All information at a glance → User protection → Storage of the last 500 measurements → Practical classification of the measured values → Prevention of incorrect results → Comfortable connection to PC → D, UK, F, I, NL, S, FIN, E, PL, RUS, JP, CN, H, TR 	<ul style="list-style-type: none"> • Integrated barcode-reader • Bluetooth • OBCC Software for data processing • Separate printer via Bluetooth for result documentation • Device for headspace analysis in cans/bottles • P version (for pressurised sample gas)
<ul style="list-style-type: none"> → Ideal instrument for all pack sizes → Direct alarm reaction avoids defective goods (by stopping the packaging machine) → Easy to read. All information at a glance → Fast, precise measurement → Storage of the last 500 measurements → Practical classification of the measured values → Comfortable connection to PC → Flexible usage → For documentation of the measured values → D, UK, F, I, NL, S, FIN, E, PL, RUS, JP, CN, H, TR 	<ul style="list-style-type: none"> • Vertical or inclined display • OBCC Software for data processing • Separate printer for result documentation • Connection plugs • Different versions available: continuous analysis, sample testing and P version (for pressurised sample gas)
<p><i>Benefits see PA, plus:</i></p> <ul style="list-style-type: none"> → Optimal information and easy to operate → Personalisation of measurements → Individual classification of results and limits → For productivity and comfort → Customer-oriented quality documentation → High measuring accuracy → High process safety → Reliable steady measuring results → The best measuring principle to suit the application 	<ul style="list-style-type: none"> • GAS CONTROL CENTRE Software for data processing • Integrated printer for result documentation • Different versions available: continuous analysis, sample testing and P version (for pressurised sample gas) • Barcode reader • Fully automatic calibration • Special version for higher inlet pressures • As 19"-rack version

PRODUCT OVERVIEW

LEAK DETECTION SYSTEMS

PRODUCT	APPLICATION	FEATURES
7 LEAK-MASTER® EASY 	Leak detection systems for packages. The LEAK-MASTER® EASY features the detection of the smallest of leaks without the need for trace gases.	<ul style="list-style-type: none"> • No trace gas required in package → • No electrical connections, operation using compressed air → • Visual test → • Testing of vacuum packages possible → • Easy to use → • Low maintenance → • Perspex housing →
8 LEAK-MASTER® 	Leak detection system for packages containing CO ₂ . LEAK-MASTER® features non-destructive testing of the smallest of leaks without the need for costly helium.	<ul style="list-style-type: none"> • Non-destructive testing → • Large and clearly arranged touch screen → • User administration → • Data storage for over 6,000 measurements → • Data transmission via Ethernet or WLAN → • CO₂-based → • Stainless steel housing → • Various chamber sizes → • Barcode reader (optional) → • Multilingual menu control → • Separate PC software →
9A LEAK-MASTER® MAPMAX (Single packages) 9B LEAK-MASTER® MAPMAX (Secondary packaging) 	In-line micro-leak detection system for packages containing CO ₂ . MAPMAX features non-destructive detection of the smallest of leaks without the need for costly helium – directly from the packaging line.	<i>Features see LEAK-MASTER®, plus:</i> <ul style="list-style-type: none"> • Fully automatic leak detection → • Various chamber sizes → • High operating speed (max 15 cycles/min) → • 100 % automatic control of all packages →

GAS MONITORING

PRODUCT	APPLICATION	FEATURES
10 GAS MONITOR 	Gas monitoring system for the depletion of oxygen (O ₂) and/or detection of carbon dioxide (CO ₂)	<ul style="list-style-type: none"> • 3 alarm limits adjustable within the measuring range → • Triple-digit display → • Connections for alarm easily accessible on front → • Continuous self monitoring → • Separate control panel and transmitter → • 4 channel control panel also available →

Product features may differ according to version

YOUR BENEFITS

- Usable without modified atmosphere (MAP)
- Easy installation and operation
- Localisation of leak
- One system for all kinds of packages
- No special skills required
- Time and cost effective
- Easy to clean

OPTIONS

- Different chamber sizes
- Available for vacuum packages
- Available for altitude simulation test

- Products remain undamaged and dry for further processing
- Optimal information and easy handling, no special skills required
- Personalisation of measurements
- For high measurement frequencies
- Customer orientated quality documentation
- No costly helium required
- Robust and easy to clean
- Testing of single packages, cartons or E2 boxes possible
- Avoiding operator errors and enhancing productivity
- GER, UK, F, E, FIN, I
- For documentation of test results

- Various chamber sizes
- Documentation software
GAS CONTROL CENTRE
- Barcode reader
- Barcode reader IP 65
- W-LAN (WIFI)

Benefits see LEAK-MASTER®, plus:

- Avoiding operating errors
- Testing of single packages, cartons or E2 boxes possible
- High productivity of packaging line
- No leaking packages are delivered to the customer – no costly returns

- Various chamber sizes
- Reject system
- Documentation software
GAS CONTROL CENTRE
- Barcode reader
- Barcode reader IP 65
- W-LAN (WIFI)

YOUR BENEFITS

- Individually adjustable alarm limits
- Permanent visual control
- Easily accessible, for easy installation
- High process safety
- Flexible installation for highest safety
- Monitoring of large areas

OPTIONS

- Flashing beacon and sounder
- Flow adapter for sensor
check and calibration
- Other gases on request

▀ OUR PRODUCT RANGE

Gas Control Equipment

- Gas mixing systems
- Gas metering systems
- Gas analysers
- Leak detection systems
- Gas pressure vessels
- Engineering of customised systems

Gas Safety Equipment

- Flashback arrestors
- Non-return valves / check valves
- Quick couplers
- Safety relief valves
- Stainless steel devices
- Gas filters
- Pressure regulators
- Outlet points
- Lance holders
- Ball valves
- Automatic hose reels
- Test equipment
- Accessories
- Customised safety equipment

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