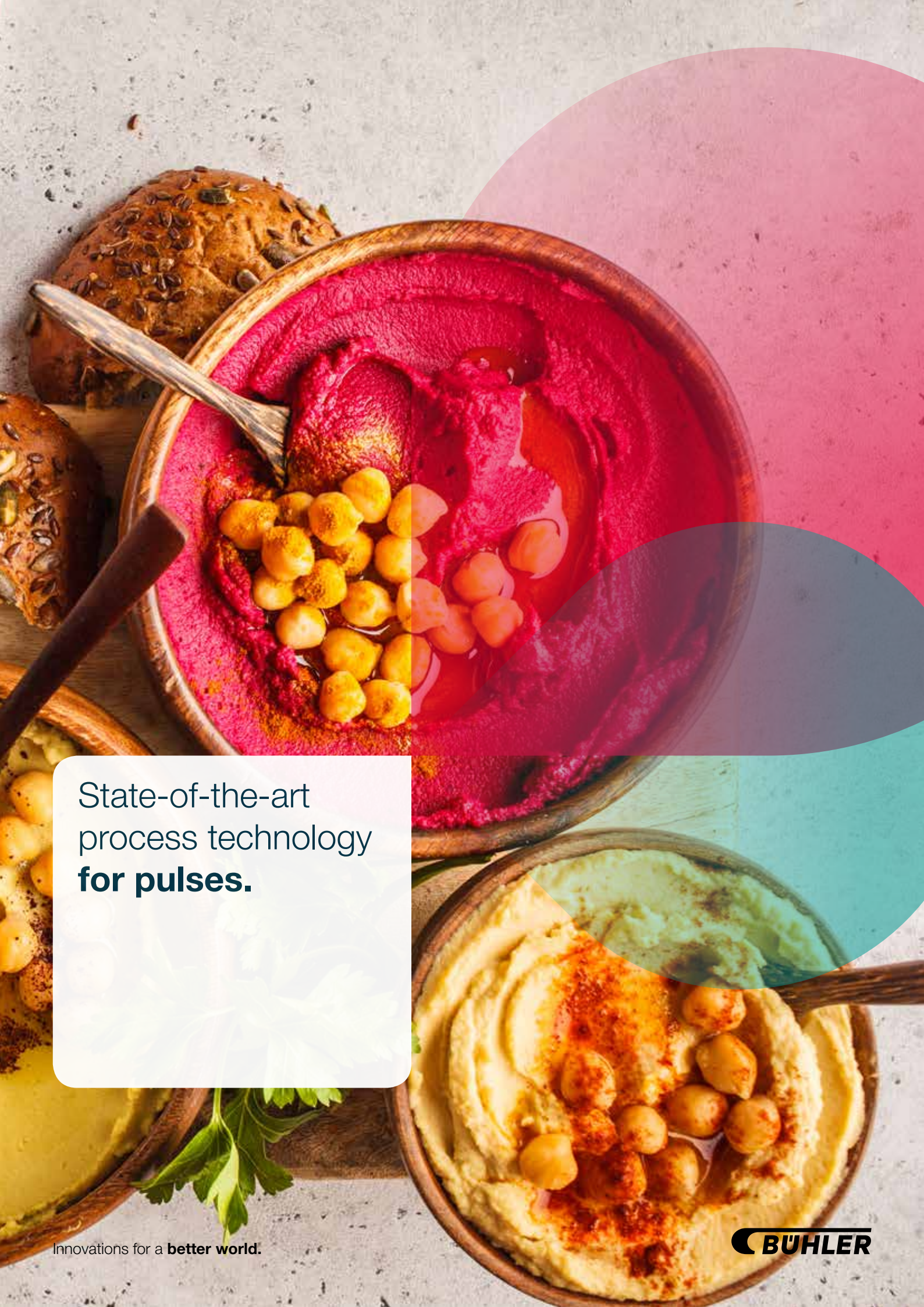


State-of-the-art process technology **for pulses.**

Innovations for a **better world.**

BÜHLER

Pulses: Much more than the answer to **present and future consumer trends.**

Pulses are part of the legume family, with the most commonly known being dried peas, beans, lentils, and chickpeas. These seed varieties have always been a staple food to many cultures around the world. In the last years they have been capturing the growing attention of the food industry, not only because they respond to all major consumer trends, but also because they will be key in ensuring sustainable food security.

Pulses are a superfood.

Pulses embed diverse nutritious properties. Two of these properties make them particularly healthy: Pulses have a high amount of fiber and are very rich in protein, and they are allergen-free, becoming a potential substitute for people with intolerance to gluten.

Bridging the protein gap sustainably.

By 2050 the projected world population will rise above nine billion people. Traditional protein from animal sources will not be sustainable. However, pulses are readily available because they have been an essential part of several regions' diets for centuries. Furthermore, pulses are environmental-friendly — not only are they water economical plants, but they also enrich the soil they grow on through nitrogen fixation, thus increasing soil fertility.

Bühler is the ideal partner to **add value to the wide versatility of pulses.**

There are more than 50 types of pulses worldwide. In each region pulses are integrated differently into food. Each type of pulse requires a unique process to achieve the desired finished product specification. Bühler offers optimum process technology for a variety of pulses.

Traditional pulses processing implies cleaning, grading, dehulling, and optical sorting. Afterwards, consumers still need to soak pulses in water over-night and cook them for long durations before they are ready to eat.

Bühler has bridged the gap between the innate inconvenient factor of pulses and the fact that contemporary consumers are looking for innovative and convenient food products. Comprising of the entire traditional pulse process, grinding, and value added processes, Bühler is able to provide entire technology solutions for processing of pulses.

Navy beans

Black beans

Chickpeas

Green peas

Red kidney beans

Red lentils

Yellow peas

Pardina lentils

Moong beans

From flour to ready-to-eat products. **We add value to pulses.**

In line with current and future consumer needs.

Pulses have been increasingly attracting the attention of the food industry to be implemented as functional ingredients. In line with this need, Bühler is able to supply comprehensive milling solutions to efficiently grind pulses into the required particle size and separate particle fractions to deliver homogeneous high protein pulses flour products.

The bridge towards convenient and delicious pulses products.

The possibilities to implement pulse flour in foods are numerous – pasta, snacks, texturized vegetable protein, bread, biscuits, wafers, are just a few examples of foods that can be transformed. Bühler offers complete technology solutions to effectively add value to these products using pulses as an ingredient.

Food ingredients - protein rich pulses flours

Pulses pasta

Textured pulses protein - for plant based meat

Healthy pulses snacks- extruded snacks and healthy wafers

Shaping the future of food together.
Global food application centers.

The business potential of pulses is given – the next step is to develop innovative products that meet consumer needs and trends. Bühler is a well-informed partner in this process. Backed by our extensive network of food application centers located throughout the world, we will accompany you from generation of a business idea through to testing your business case, until we find a customized solution to meet your specific market needs.

Focusing on pulses processing, Bühler has application centers in Switzerland, India and most recently, also in the USA. Our new food application center in Minneapolis has particularly been conceived to gather and develop knowledge around pulses. Bühler experts will assist you in testing your business ideas at a state-of-the-art pilot plant for pulse processing. From conventional pulses to innovative value add products – such as healthy snacks, wafers, and texturized vegetable protein – together with our customers we look to reinvent pulses for the 21st century and beyond.

Food application center, Bühler Minneapolis

Latest technology for high quality pulses products. **Bühler – a one stop solution provider.**

In conventional pulse processing, the interaction of each step is crucial to ensure optimum results:

- A comprehensive cleaning to remove impurities such as stones, sand, metallic parts, and foreign grains – ensuring food-safe finished products
- Grading to sort pulses according to size to be more efficient in the subsequent steps. Also obtains uniform and better quality-finished products
- Dehulling is to remove the anti-nutrients and indigestible fibers contained in pulses, also improving appearance and texture. Splitting and polishing are optional process steps that help satisfy specific consumer needs
- Through optical sorting, further foreign material which cannot be separated mechanically is removed. It is ensured, that the finished product is uniform and compliant to highest food safety standards

Bühler seamlessly integrates overall pulse processes to ensure maximum yield, food safety, and top product quality.

Why Bühler?

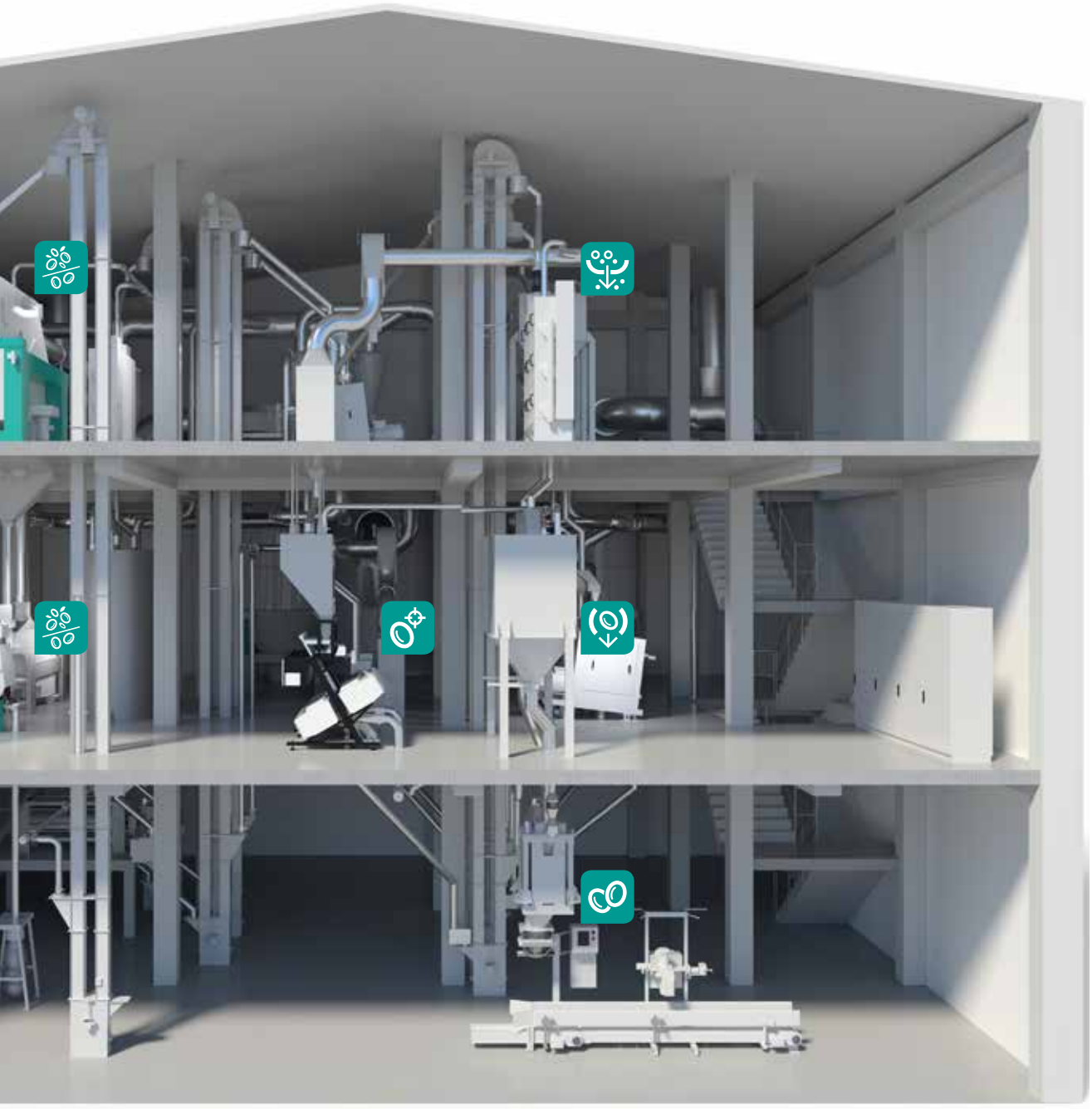
— Efficient product handling for maximum yield

— Flexibility to process a wide range of pulse products

— Top class products of consistent quality

— Food safe solutions

Dry Pre-Cleaned Pulses — **Cleaning** — **Grading** — **Dehulling** — **Optical Sorting**



Cleaned, Dehulled Pulses

Fine-Grinding

Air-Classification

Protein Rich Flours

Further Processing
Pasta, extrusion snacks, wafers, and other tasty and nutritious products

Integrated components.
Effectiveness for top quality finished products.

Bühler develops integrated technology for producing premium quality pulse products. With flexibility to be applied to different types of pulses, Bühler's technology solutions are highly efficient and enable maximum yield. Reliable automation enhances productivity, reduces energy consumption, and optimizes easy maintenance. As a leading solution provider for the food industry, Bühler is always close to the market and flexibly adjusts to the requirements of its customers.

Screening Machine Grainplus.

Optimum size grading and separation of diverse impurities.

The Grainplus removes everything bigger and smaller than the desired raw material. For capacity ranges up to 50 t/h the Grainplus is universally applicable to all types of pulses and easy to use. Additionally, all the machine parts touching the product are easily accessible and therefore easy to clean – meeting high sanitation standards. Grainplus has a compact and robust design and delivers excellent cleaning results. Additional machines such as the destoner and the concentrator are also key within the cleaning section and ensure meeting high food safety standards.

Pulsroll Dehuller.

Gentle hulling performance delivering uniform finish and quality on a range of pulse varieties.

Exclusively designed for pulse processing with a capacity of up to 4 tons per hour, the Pulsroll offers flexibility to process different types of pulses with precise control through easy adjustment. A robust design contributes to less wear and high throughput with low power consumption. The Pulsroll delivers high hulling efficiency, lower brokens and optimum finish.

SORTEX® A MultiVision.

Combining Bühler's most sophisticated sorting capabilities for superior or premium quality pulses.

The first choice for pulse processors with challenging applications, SORTEX A MultiVision optical sorter separates impeccably by color and shape – removing foreign material that cannot be separated mechanically – for example, separating dehulled from undehulled pulses. For pulse splits production, it also separates by shape, ensuring to remove whole pulses before packaging. All in all, with its three-in one color, shape and size detection software, the MultiVision offers processors absolute control over quality of the products to match any market requirement.

We support you with our service.
Throughout the entire life cycle of your mill.

Consulting and Engineering.

During our comprehensive consultation, we understand your requirements in detail to deliver solutions that will advance your sustainability. With our decades of experience in planning and realization of milling systems, we design flexible, economic and reliable solutions for you – from standard mills to fully customized systems.

Process Systems and Equipment.

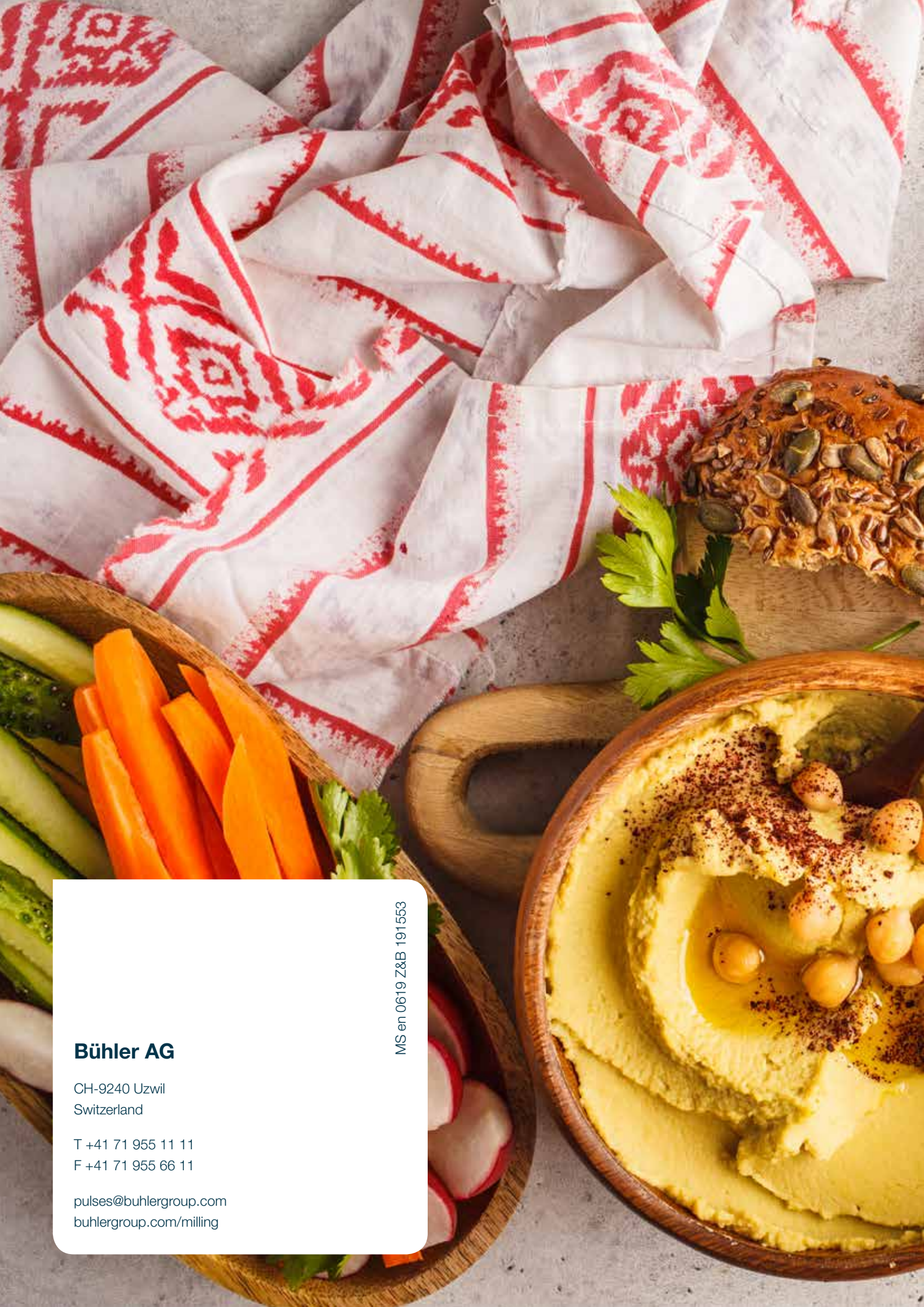
A mill is more than the sum of its parts. As a technology leader in the grain processing industry, we always consider the overall process. This gives you peace of mind that all our solutions are perfectly tailored to one another – from spare part to machine to complete system. This means consistent increase in productivity and quality.

Automation.

Integrated automation solutions make production solutions more efficient, lower energy consumption and increase operational safety. We offer the complete package for your automation – from installation to ERP integration. Bühler systems are ready for the digital transformation – with comprehensive networking and increasing digital services.

Customer Service.

Highly trained service staff in 140 countries worldwide provide advise and support on site. Beyond that, we offer a digital overview of your machines and a simplified procurement process with our online platform MyBühler. Whether maintenance, spare parts, retrofits, repair, revisions or digital services – our services extend the lifetime of your system, minimize downtime, and increase your productivity.



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