



BENNINGER

Washing  
Solutions

Woven Line

# Leader in wet textile finishing



## BEN-WASH

The complete range for all washing processes

- Excellent washing performance
- Minimum water consumption
- High energy efficiency
- Up to 50 % water and steam savings in comparison to the exhaust process



## BEN-BLEACH

Continuous desizing and bleaching in one process

- High productivity
- Best pre-treatment results
- 30% lower production costs



## BEN-COLOR

The complete program for continuous and CPB dyeing

- High reproducibility
- Even dyeing results
- Low energy and water consumption (CPB)
- High fastness properties
- No salt



## BEN-DIMENSA

Highest quality mercerizing for the maximum luster, dimensional stability and dye yield

- Improved dimensional stability
- Higher dye yield
- High luster
- For woven fabric and knitwear
- Silky, soft feel



## BEN-ECO

Environmental protection and cost savings by recovering energy and resources

- Caustic recovery systems
- Heat recovery
- Waste water recycling and "zero discharge" solutions
- Energy-efficient drive technology
- CO<sub>2</sub> reductions by the use of the latest technologies

# Customised textile solutions

## Mission

### Customised

Benninger supplies tailored process solutions with innovative and reliable products as well as comprehensive know-how in textile process engineering, always based on close collaboration and communication with our clients.

### Textile

Our concepts are fully geared to the textile applications of our customers. With its many years of experience and comprehensive textile competence, Benninger creates long-term added value for its customers. Benninger is backed by a large number of reference installations for each of the individual applications.

### Solutions

Benninger is an integral solution provider. We plan and implement technologically optimised and individual process and system solutions. We are a trustworthy and reliable partner throughout the entire life cycle of the plant.

## Sustainability

For Benninger, assuming responsibility is a matter of course. We are committed to sustainability – for example by investing in the development of high-quality products as well as ecologically efficient processes. We actively save water, energy, chemicals and we also focus on recycling waste water, exhaust heat and valuable materials. Integral consideration of the relevant factors is equally as important to us as the balance between ecological and economic concerns.

With regard to sustainability, Benninger has central obligations. Wherever possible we work with maximum environmental awareness and conserve resources. We are aware of our social responsibility towards communities, consumers and our employees. We continuously improve our economic performance and support the sustainability aims of our customers.

## Customer benefits

Our clients do not need products, they need solutions. At Benninger, customer benefits and needs are the central focus of all activities. High quality, process know-how, many years of specialist competence, unique application know-how, local availability and flexibility make us a reliable solution provider for the textile industry.

Our range of goods and services is continuously optimized and supplemented. We have tremendous innovative power, a high level of specialist and process expertise and have installed a large number of systems. New findings are continuously included into the development of solutions – always with the aim of enhancing the success of our customers. We improve the entire value-added chain of our customers by observing the process life cycles, and with quality products and a comprehensive range of services guarantee efficient and reliable plant operation.

## Tradition

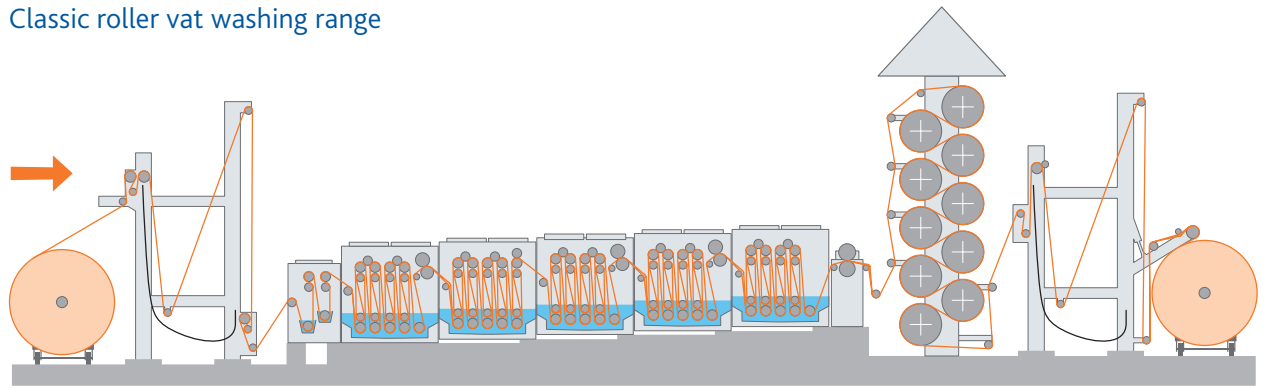
The future is rooted in the past. There is hardly anything more important than one's own history, as the innovations and business relationships of today and tomorrow are founded on the experience and know-how gained in the past. Benninger has been a global benchmark for competence and outstanding performance in wet textile finishing for more than 150 years. We always feel bound to our cultivated tradition of continually improving our services, products and processes so that the Benninger brand will continue to stand for quality, reliability and vision in the future.

As a company with international operations we are proud to support our customers on a basis of partnership and carry Swiss values such as high quality, reliability and trustworthiness out into the world.



# An optimum solution for every application

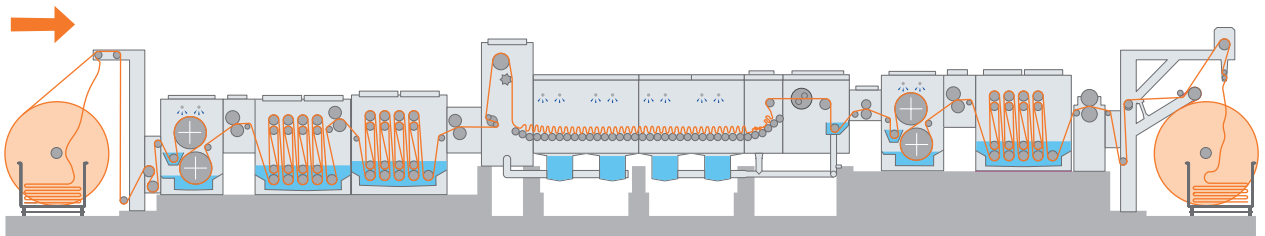
## Classic roller vat washing range



Desizing  
Washing out cold bleach / alkali  
Dye / print washing

High washing efficiency for caustic soda, sizes and dyestuff

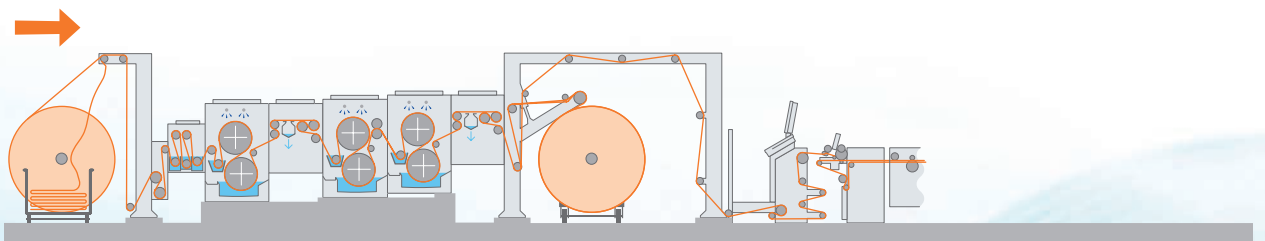
## Combined drum and roller vat washing range



Dye washing  
Print washing

High fastness level for washing, water and rubbing fastness.

## Drum washing machine for elastic woven fabrics



Pre-washing, preparation washing  
Desizing  
Relaxation of synthetic woven fabrics

Reduced quantity of silicone and oils residuals  
Controlled shrinkage of synthetic fibers (separate or in line with dryer)

# Washing process requirements

Correct washing is of central importance in textile finishing and is influenced by the factors mechanics, time, temperature and water. The individual factors influencing the washing process vary depending on the washing task.

Depending on the washing process requirements, Benninger combines the units so that optimum results are achieved with regard to the washing efficiency as well as the water and energy consumption.

## Weighting factors of the washing process

### Dilution wash

- Caustic soda
- Hydrogen peroxide
- Emulsified oils
- Salts

### Fastness wash

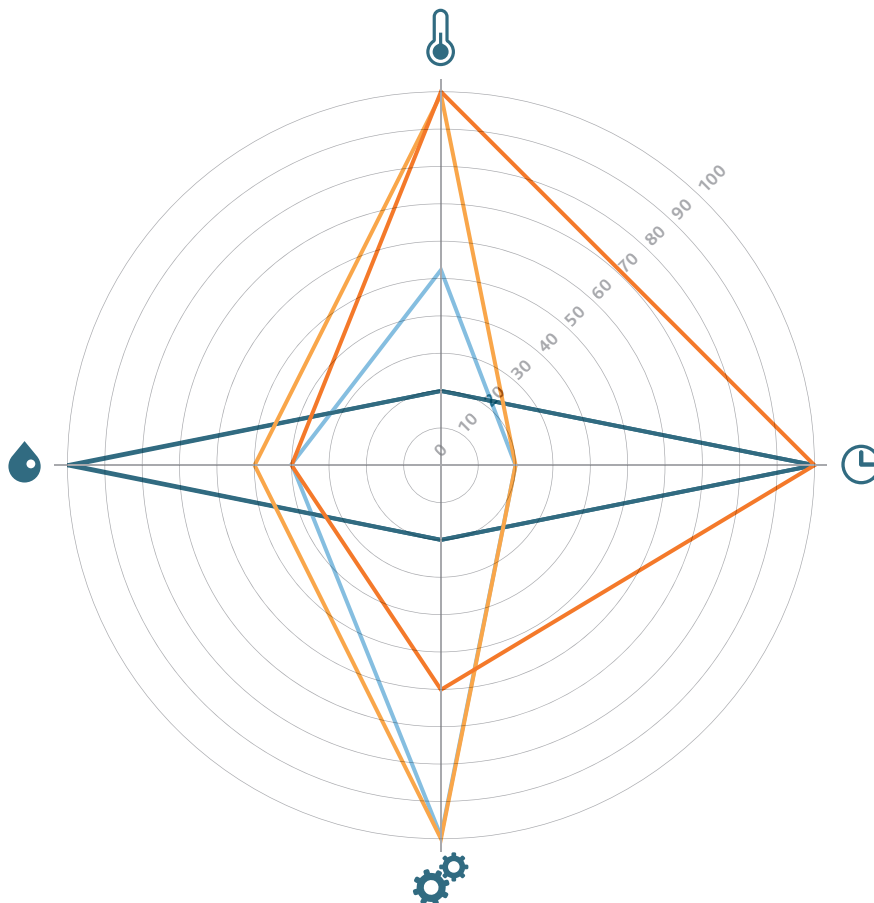
- Dyestuff hydrolysate

### Reaction processes

- Neutralisation
- Oxidation
- Impregnation

### Swelling processes

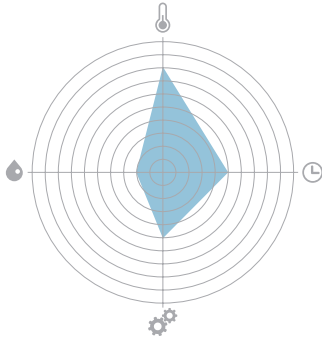
- Thickeners
- Sizes
- Pigments, greases, oils



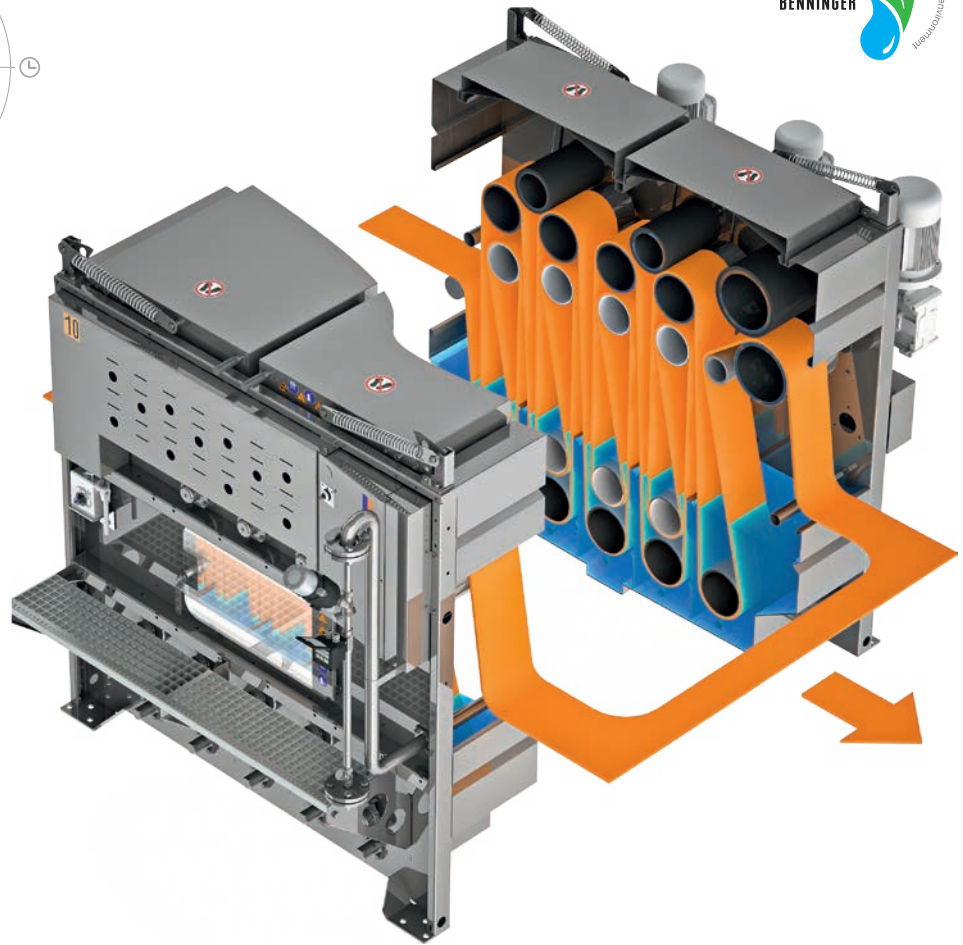
-  Temperature
-  Time
-  Mechanics
-  Water/Chemistry

# EXTRACTA

High washing efficiency due to the multi-chamber system

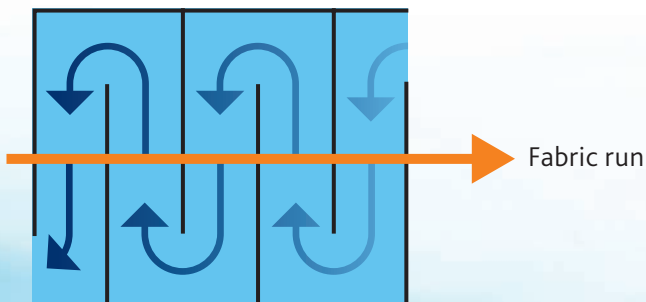


Roller vat washing compartment for woven fabric



## Counterflow principle

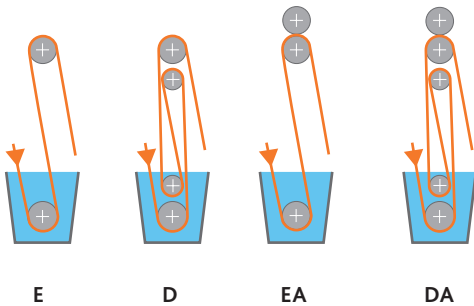
The meander counterflow configuration permits a concentration gradient. The washing process is divided into several washing steps that are repeated. The washing results can therefore be calculated on the basis of models and guaranteed.



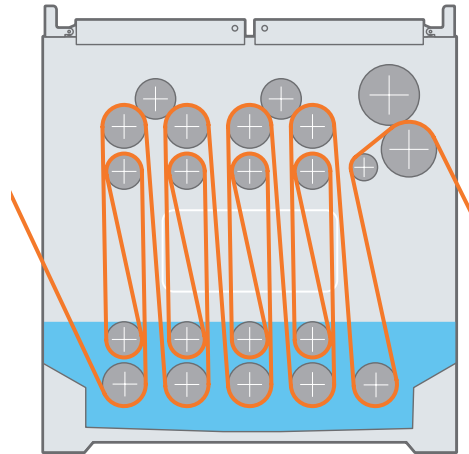
## FACTS

- Washing in several small steps with liquor separation
- Calculable washing effect
- Low water and energy consumption
- Crease-free fabric run
- Steamtight
- Can be used for all high-performance washing tasks and also combined with waste water recycling or partial flow disposal
- Can be combined with all Benninger washing units

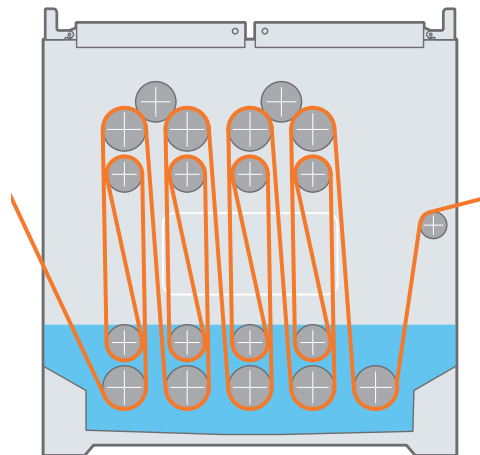
# Configuration variations for specific requirements



- E = Single loop threading
- D = Double loop threading
- E = Single loop threading, Extracta press roller
- DA = Double loop threading, Extracta press roller

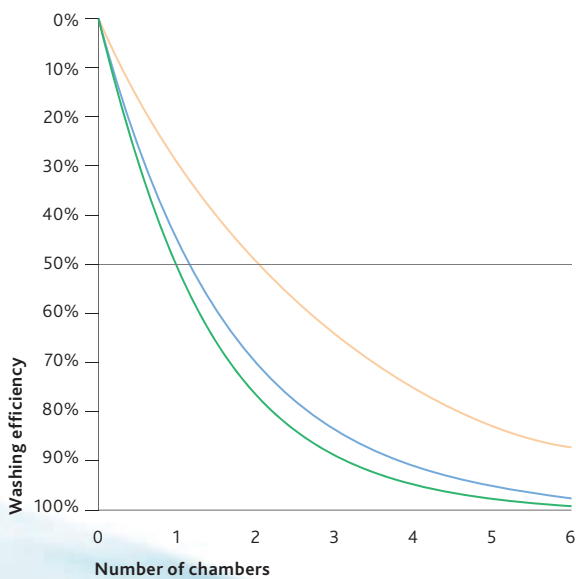


Washing compartment with integrated squeezer



Washing compartment without integrated squeezer

## Extracta press rollers increase the washing efficiency



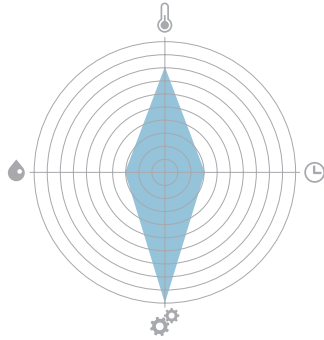
- Without press rollers 4 l/kg
- Without press rollers 10 l/kg
- With Extracta press rollers 4 l/kg

## Calculable washing effect

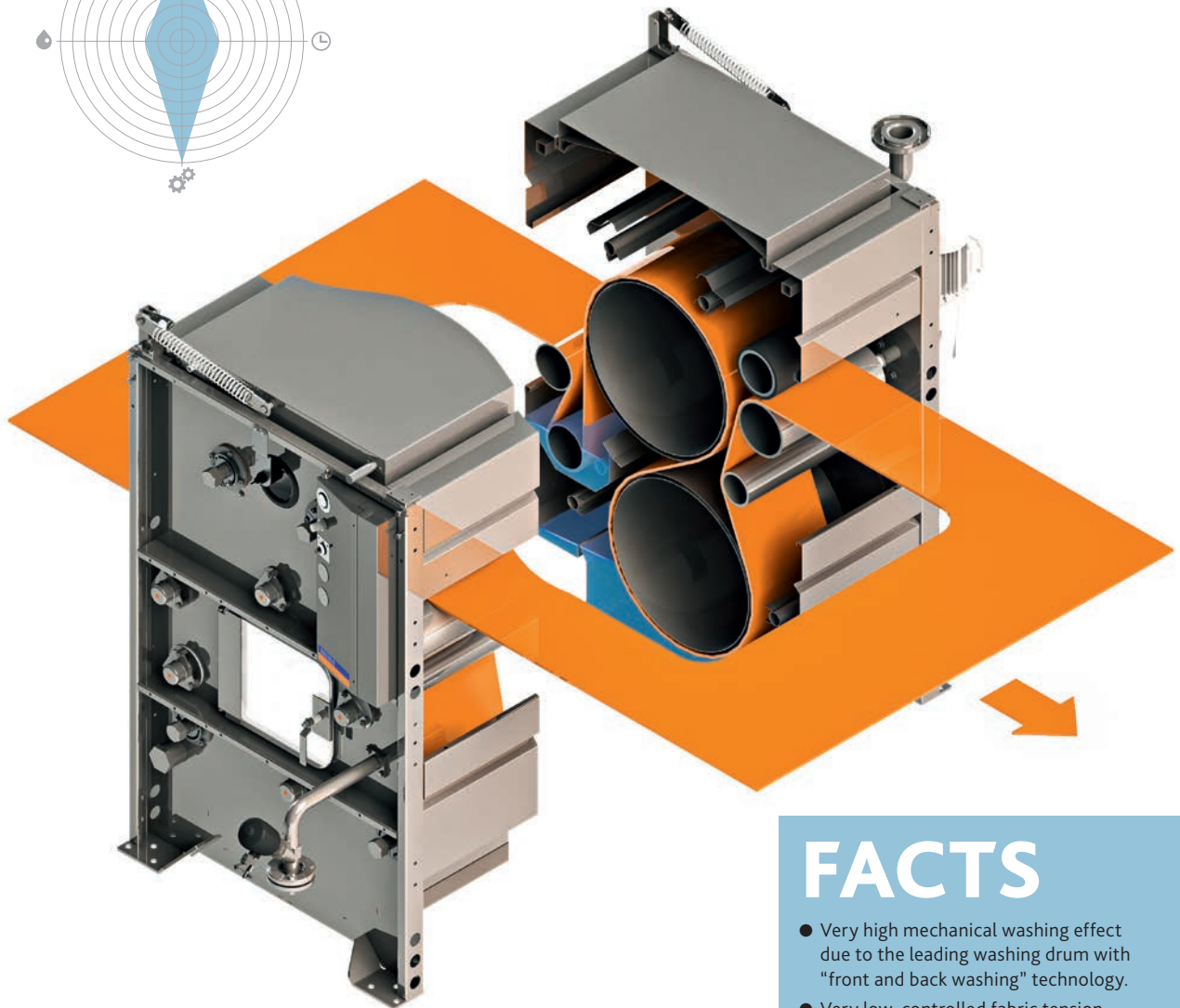
At Benninger the washing process is divided into regular, repeatable individual steps. The contaminants or chemical liquor contained in the woven fabric are replaced with the washing liquor in each of the separate washing chambers. The washing liquor then picks up contaminants and chemicals accordingly. In the next chamber the liquor is replaced at the same height, but with washing liquor with a lower contaminant concentration. The Extracta press rollers retain contaminants in the washing chambers, achieving a significantly higher washing efficiency. The following applies as a general rule: 4 l/kg of water with press rollers correspond to 10 l/kg without press rollers.

# TRIKOFLEX

Efficient washing of  
tension-sensitive textiles



**Drum washing compartment**  
for elastic and technical woven fabrics

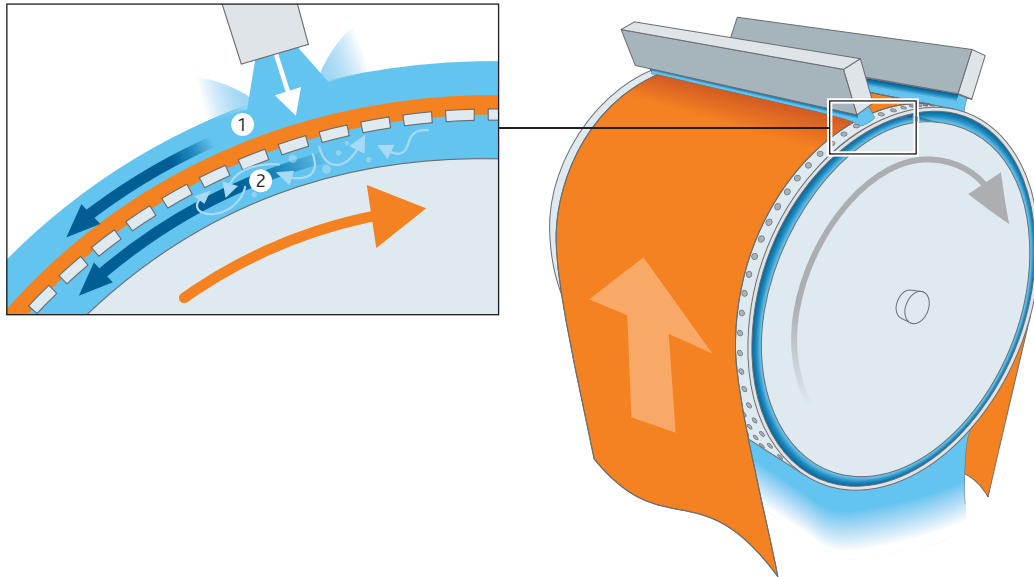


## FACTS

- Very high mechanical washing effect due to the leading washing drum with "front and back washing" technology.
- Very low, controlled fabric tension
- Very low water and steam consumption thanks to counter-flow washing technology
- Crease-free fabric transport, also with sensitive fabrics
- Controlled relaxation of synthetic and elastane fibers
- Specially developed overflow blade for flushing out oil and grease during the preparation wash
- Can be combined with all Benninger washing units



# Optimum washing effect due to the leading drum washing technology

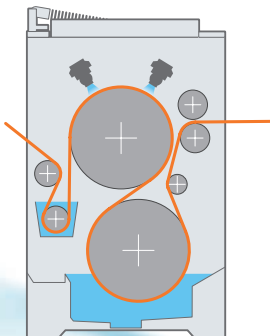


## "Front and back washing" principle

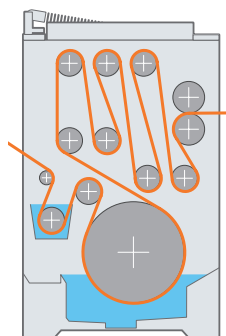
The washing liquor penetrates the fabric and forms a film of liquor on the front (1) and back (2). In this way contaminants are quickly removed on both sides. The washing effect is increased by 40 % in comparison to simple net or perforated drum systems.



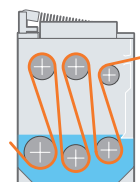
## High-efficiency drum washing compartment



## High-efficiency drum washing compartment with integrated dwelling zone.

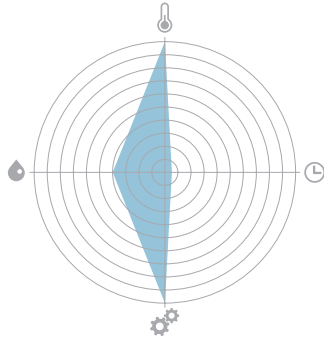


## High-performance rinsing trough

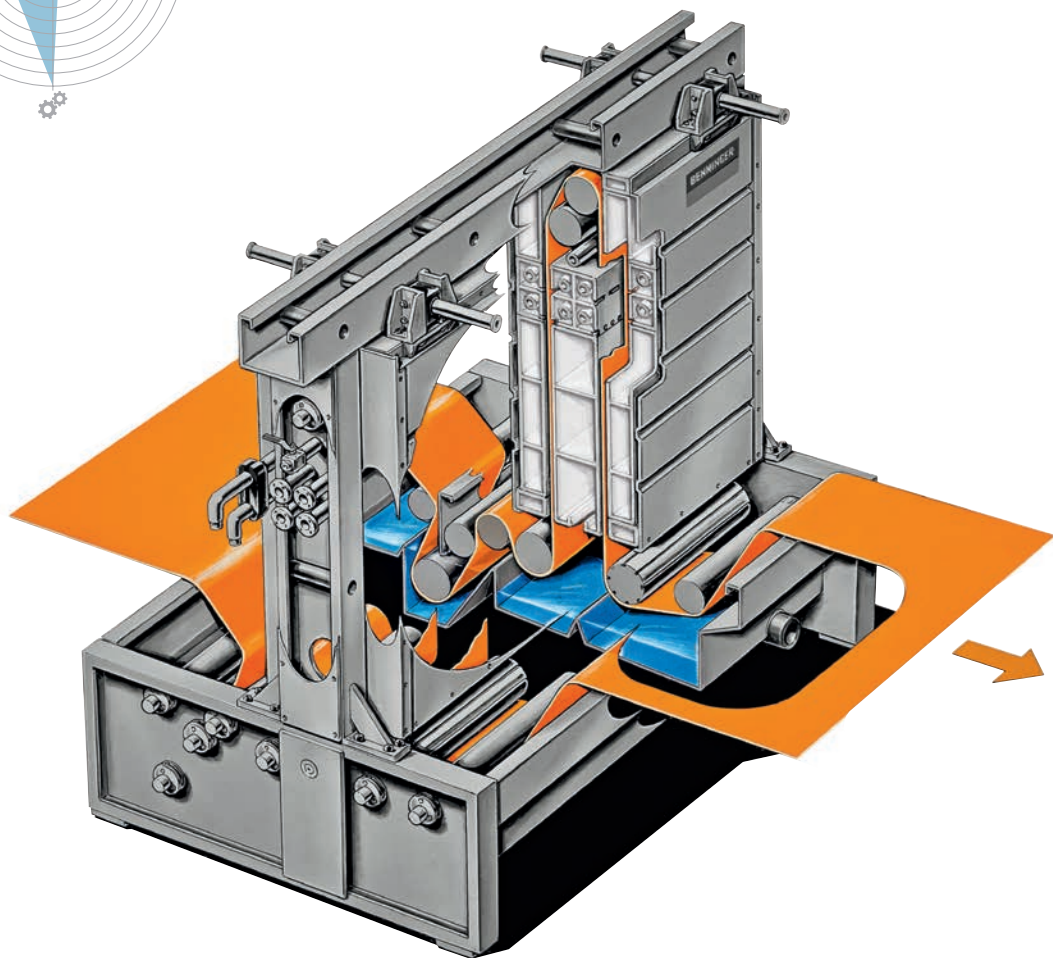


# INJECTA

Speedy swelling for optimized contaminant solubilization



Pre-swelling unit  
for high-viscosity substances

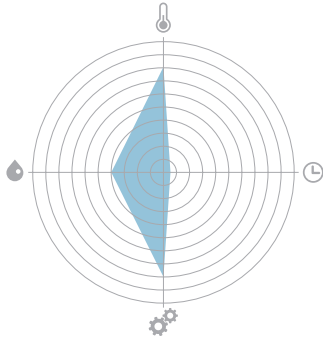


## FACTS

- High mechanical washing efficiency due to steam injection
- Ideal washing unit for swelling and solubilization of high-viscosity substances
- Ideal for size recycling due to high partial flow concentration
- Can be combined with all Benninger washing units

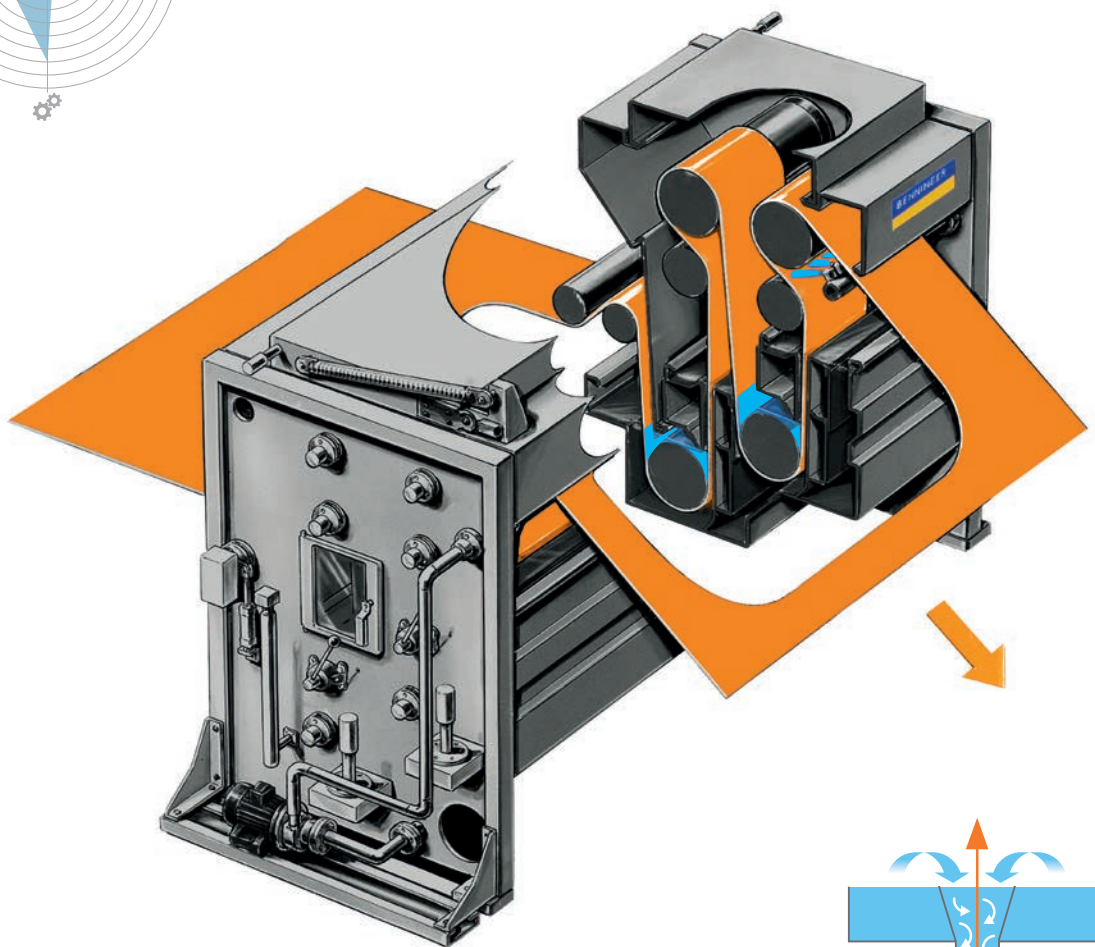
# FORTRACTA

Effective pre-washing for removal of surface contaminants



## Prewashing unit

A further development of the proven Benninger duct washing technology for removing surface contaminants.

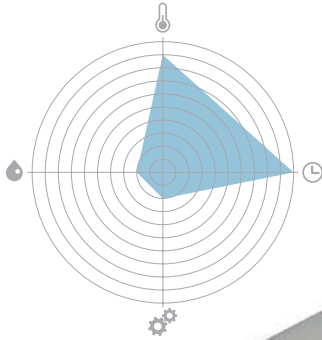


## FACTS

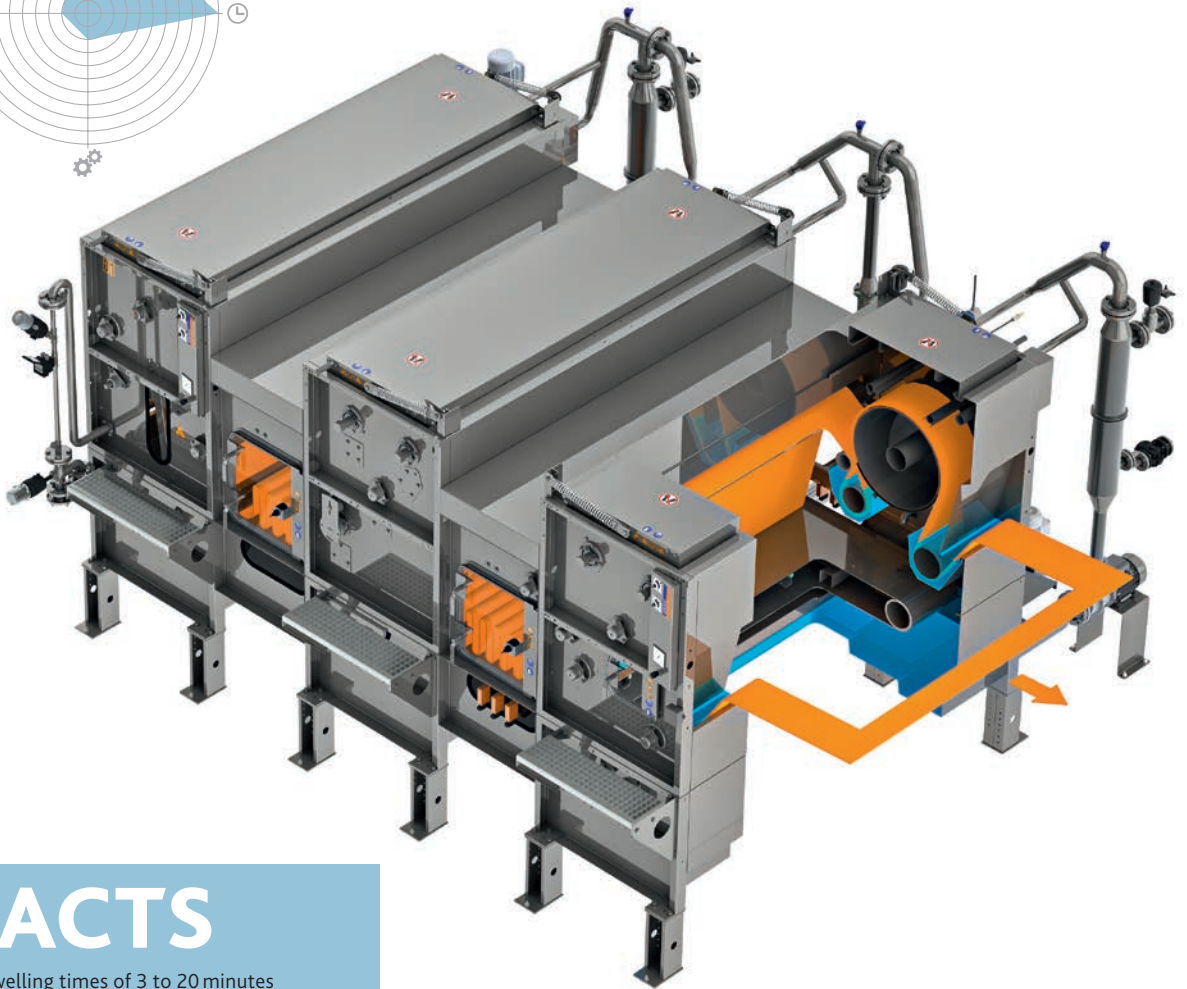
- High mechanical washing efficiency due to "waterfall" technology
- Ideal for pre-washing surface contaminants
- Very low maintenance requirements
- Can be combined with all Benninger washing units

# TEMPACTA

## Washing through to the core



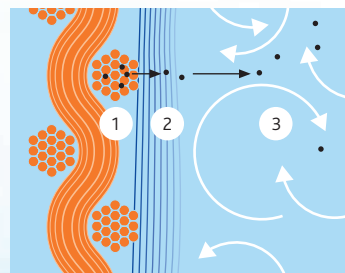
**Washing and dwelling unit**  
for reaction, relaxation and soaping processes



## FACTS

- Dwelling times of 3 to 20 minutes guarantee successful washing results
- Washing at boiling point
- Washing assistance or intermediate rinsing processes with drum washing technology
- Can be combined with steam blade for intensifying the mechanical washing effect
- High modularity
- Suitable for lightweight and thin fabrics as well as heavy fabrics
- Suitable for diffusion washing processes (fastness wash) and for relaxation
- Can be combined with all Benninger washing units

Woven fabric    Laminar layer    Turbulent liquor



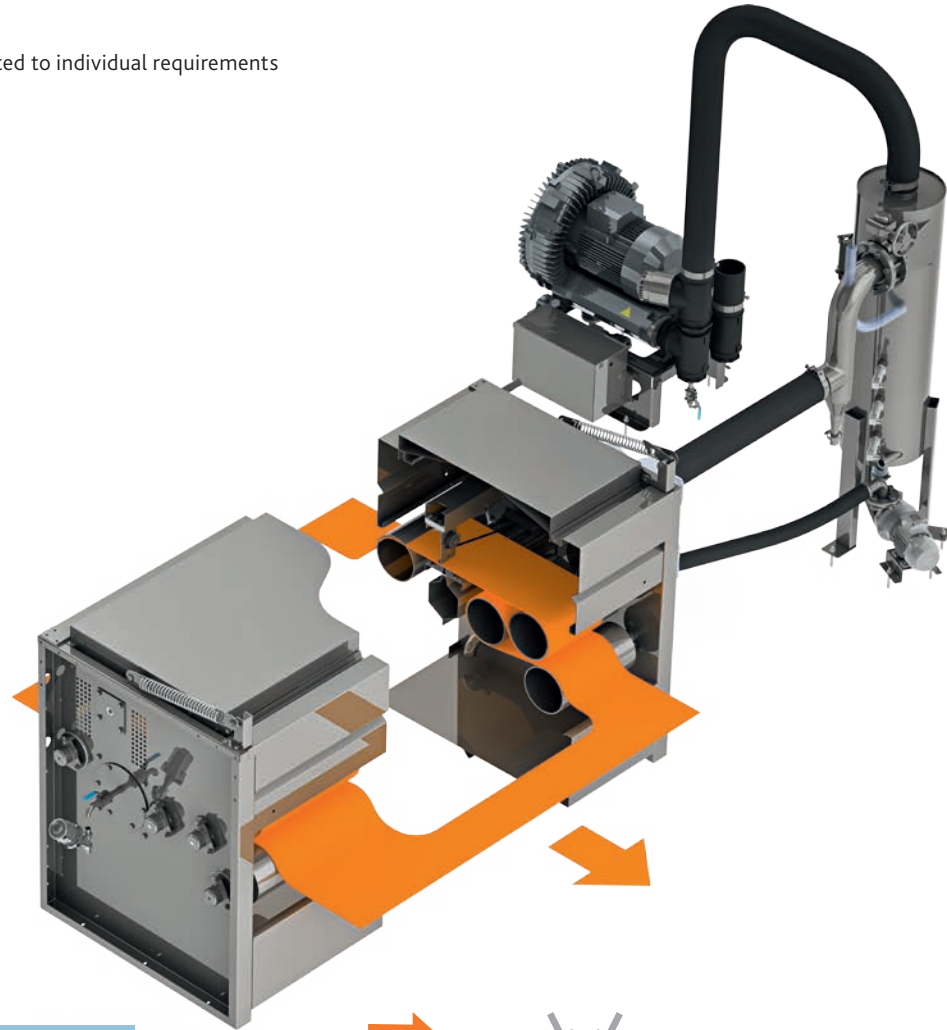
- 1 Migration from the core
- 2 Migration through the laminar layer
- 3 Fabric discharge (evacuation)

# HYDROVAC

## Economical water extraction

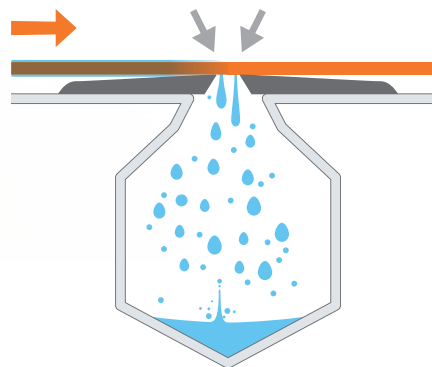
### Energy-saving vacuum unit

High water extraction rates adapted to individual requirements



## FACTS

- High-efficiency vacuum unit with very low energy consumption
- High water extraction rates on synthetic fibers
- Easily adjustable slot widths
- Very high degree of regularity over the width of the fabric due to air routing technology that is suitable for any width
- Automatic slot sealing
- Ideal for partial flow disposal
- At the forefront in vacuum technology for more than 40 years
- Can be combined with all Benninger washing units



# WHAT ARE THE BENNINGER ADVANTAGES?

## Benninger – Your partner for textile finishing!

### Technological competence

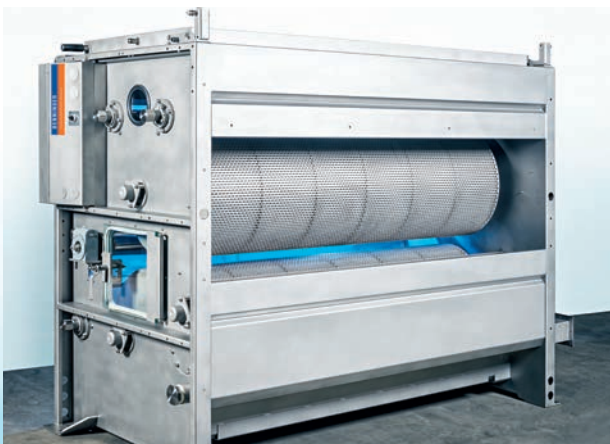
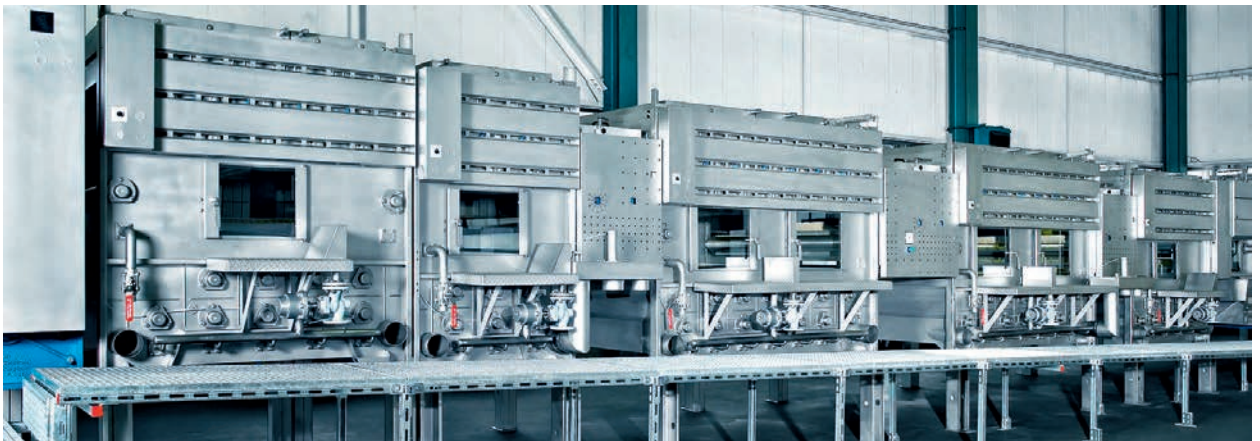
Benninger is distinguished by its comprehensive process know-how in both application consulting and project planning as well as by its close communication with customers throughout the entire life cycle of the installed plants. With its focus on engineering and a high standard of technical competence, Benninger is a recognized global pioneer in technology.

- High technology and application expertise
- Process consulting and project planning
- Sustainable resource management
- Carbon footprint
- Best available techniques (BAT)

### System solutions

As the leader in its line of technology, Benninger provides competent advice and supplies innovative and effective product solutions to the required quality standard by the agreed deadline for a fair market price, backed by reliable, first class customer service.

- Complete product range (woven and knit)
- High process reliability and lower operating costs
- Performance guarantee / Payback calculation
- Technology trends and product innovation
- Premium-quality OEM components



### After-sales service – full service

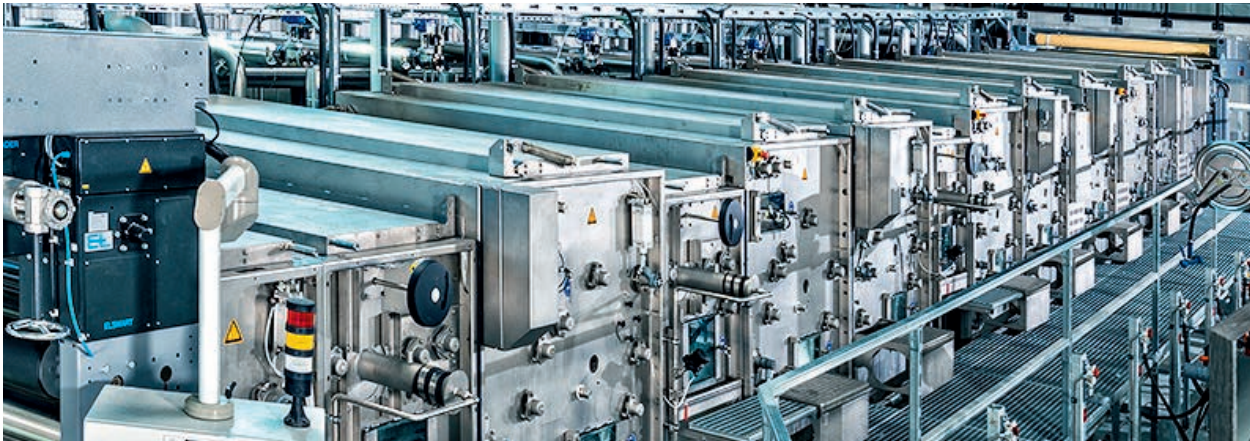
With Benninger you are always in good hands. Specialists are always at your disposal at the Benninger service centers and provide competent, prompt customer service. Regular maintenance by expert technicians minimizes unexpected downtimes and, as experienced instructors, they pass on their know-how. In addition, the specialized spare parts service team guarantees fast and reliable supply of original Benninger spare parts, rounding off the range of Benninger services.

- Customer-oriented service solutions
- Preventative maintenance (service contracts)
- Fast on-site service
- Competent help desk (software and hardware)
- Technical audits
- Customized modernization solutions
- Original Benninger spare parts (warranty)
- Customer training

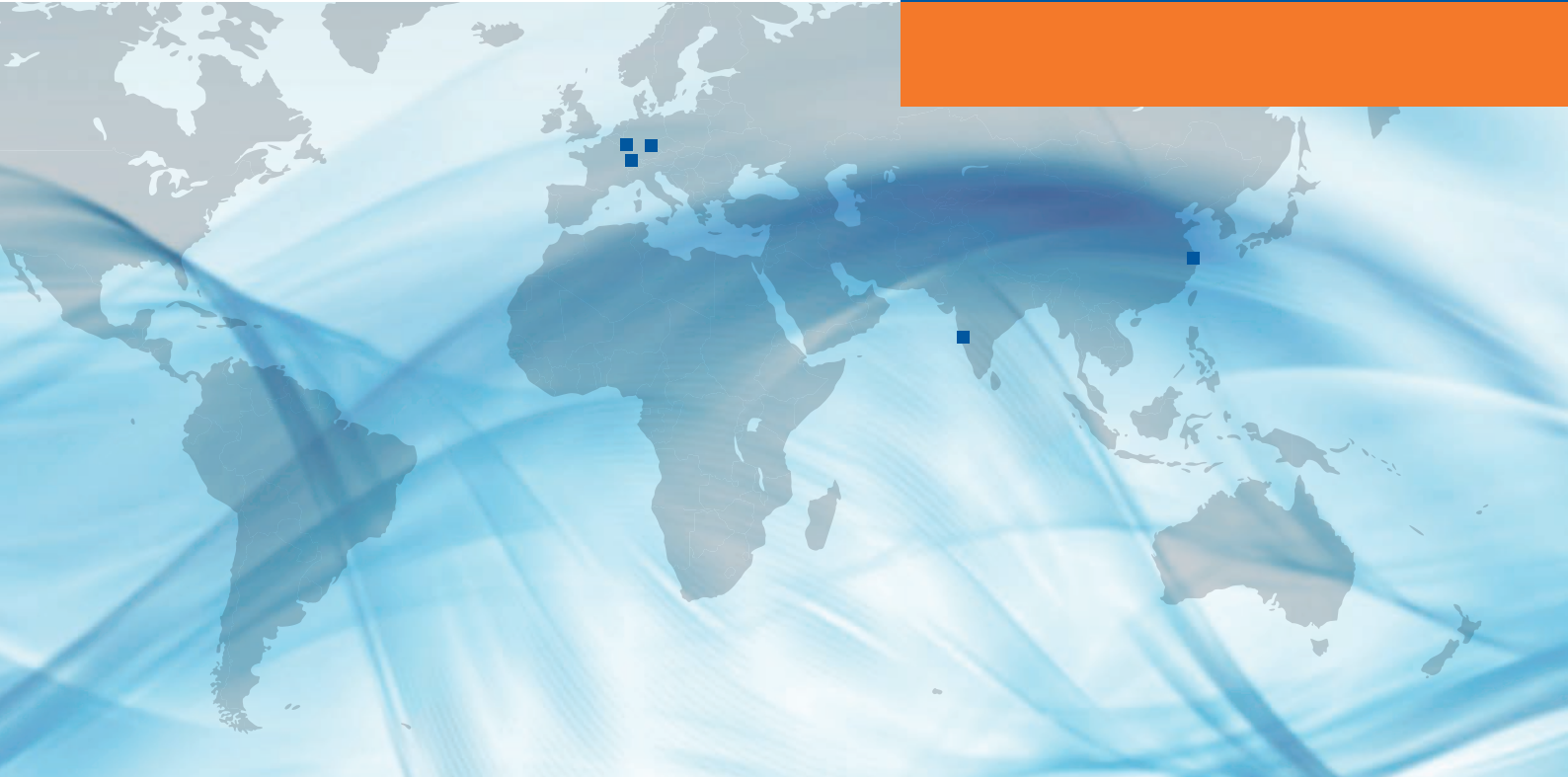
### Development cooperation and partnerships

Benninger is distinguished by its process and customer orientation, focus on the demands of the market and its customers, as well as continuous and systematic improvement. All this ensures customer confidence and satisfaction. Benninger – your partner for textile finishing!

- High specialist competence
- Consistent customer orientation
- Reliability and integrity
- Local representation in strategic markets
- Large number of reference installations
- Excellent reputation and long-standing customer relationships
- Goal-oriented development cooperation



# BENNINGER



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