



WASHING SOLUTIONS

PRO-SONIC®

PRO-OPTIWASH®

PRO-INNOWASH®

washing machine
lave-auto
Waschmaschine
yıkama makinesi
encolado
autolavaggio
Washing machine
Washing machine
Washing machine

ULTRASONIC WASHING SOLUTIONS FOR THE TEXTILE INDUSTRY

The new Ultrasonic solution for textile treatment machines from PRO-SMH offers the users of the textile industry various advantages:

on the one hand, the amount of chemicals, which results from finishing processes like desizing, bleaching or mercerizing can be reduced up to 30% and on the other hand the water amount can be reduced to one third. At the same time, the textile treatment process becomes much more sustained and more economically by this innovative Ultrasonic method.

The Ultrasonic system, which can be integrated easily into existing washing-ranges, additionally leads to better results in shorter time.

The Ultrasonic waves increases the absorption capacity of fabric which leads to an increased chemical reaction. Chemicals which are used during desizing, bleaching, mercerizing, dyeing and impregnating, penetrate more fast and effective into the fibres of the fabric. Moreover, the Ultrasonic effect increases the cleaning power of the water in the subsequently washing processes. All processes can be realized with clearly less temperatures.

Advantages of Ultrasonic washing at a glance:

- reduction of chemical use up to 30%
- reduction of water consumption up to 35%
- reduction of operating costs of approx. 30%
- increased environmental protection
- high process reliability
- homogenous results in the shortest time with low temperatures

ULTRASONIC – WORKING PRINCIPLE

At the heart of Ultrasonic Cleaning is the bubble; actually, lots of bubbles. These bubbles are created by sound waves as those waves move through water. This is known as cavitation which is simply the formation of bubbles (a cavity) in water. If you've ever seen the foam left in water by a spinning boat propeller, then you've seen cavitation in action.

Although propellers seem to spin incredibly fast when moving a boat, the bubbles they produce from that spinning can't be used to clean. This is because while PRO-SMH Ultrasonic Washing units do clean using cavitation, the bubbles produced by our Ultrasonic machines are very different from those produced by a propeller in two important ways:

- first, our bubbles are enormously powerful compared to propeller bubbles.
- second, our bubbles are microscopic which makes them incredibly efficient.



BUBBLE CREATION UNDER LIQUOR

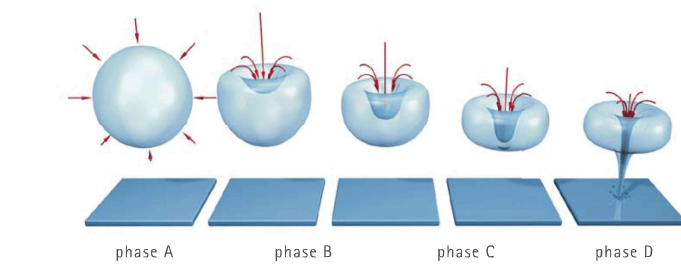
Since bubbles such as those created through cavitation are just empty space, there's nothing to keep them open. As a result, these bubbles collapse, or implode, almost as fast as they are created.

In our machines, this happens millions of times per second. This constant implosion produces tremendous vacuum energy in the form of heat and pressure. It's this combination of heat and pressure which gives Ultrasonics its cleaning capability and power. When cavitation happens near a dirty object, the vacuum action produced by those million of bubbles constantly imploding creates a tiny pressure wave that reaches deep into the fabric.

This tiny pressure wave dislodges and breaks up the dirt and other contaminants and gently lifts it away. The result is a very fast and effective cleaning.



CAVITATION CREATION UNDER LIQUOR

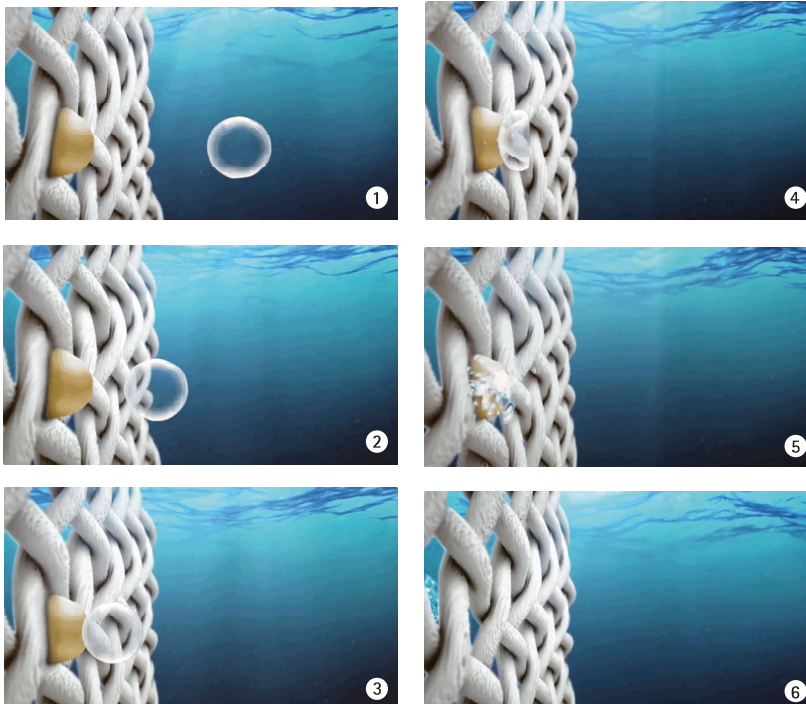


ULTRASONIC CAVITATION

What happens when we subject a certain quantity of water at room temperature to an intense ultrasonic field?

During the vacuum phase (see above phase A) numerous bubbles of gas are formed in the liquid and which enlarge for the duration of the acoustic vacuum phase (negative pressure). This formation of microscopic bubbles of gas is the start of cavitation. During the second phase of ultrasonic compression (see phase B), the enormous pressure exerted on the newly expanded bubble compresses the same, hugely increasing the temperature of the gas contained in it (see phase C) until the bubble collapses on itself, imploding with a consequent vast release of impact energy (see phase D).

The impact energy caused by implosion of the gas bubble hits the surface of the fabric to be cleaned, interacting both physically and chemically.



CLEANING PROCESS

PLATE TRANSDUCER

The plate transducer combines practical frequency pairs for two-stage cleaning processes and is suitable for up to 3.000W power. PRO-SMH configures this transducer to your individual requirements.

benefits at a glance:

- Two frequencies
- Smaller design through multi-frequency resonators
- Design concept transducer = tank allows for best possible space utilization
- High degree of customization to fit customer cleaning tanks and units of various shapes



PLATE TRANSDUCER

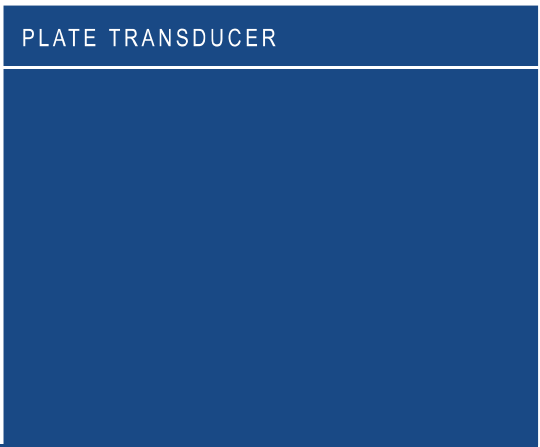
FREQUENCY/POWER	500W	600W	750W	1.000W	1.200W	1.500W	1.800W	2.000W	2.400W	2.600W	3.000W
25/50kHz	x	x	x	x	x	x	x	x	x	x	x

GENERATOR

The digital generator is the most flexible, efficient and stable. It works with up to three frequencies in various power classes from 1.000 to 3.000 watts. Furthermore, this unique integrated frequency and amplitude modulation creates homogeneous sound fields and prevents »standing waves«, thereby meeting virtually every cleaning requirement faster and more efficiently. The control functions, for example the fully digital generator series' mains voltage management, make it particularly reliable. The available interfaces and the optional transducer connection offer the greatest flexibility for all applications.

benefits at a glance:

- **INTELLIGENT CONTROL**
With digital technology you always clean at the ideal operating frequency.
- **MAXIMUM FLEXIBILITY**
Take care of a wide range of cleaning tasks with up to three frequencies and a second transducer connection.
- **UNLIMITED POWER**
Benefit from the best cleaning quality and the highest level of process reliability at up to 3.000W.
- **PLUG & PLAY**
Simply connect your generator to the mains and the transducer –and it's now ready to run.



FREQUENCY/POWER	1.000W	1.200W	1.500W	1.800W	2.000W	2.400W	2.600W	3.000W
25/50kHz	115/230V	115/230V	115/230V	115/230V	115/230V	230V	230V	230V

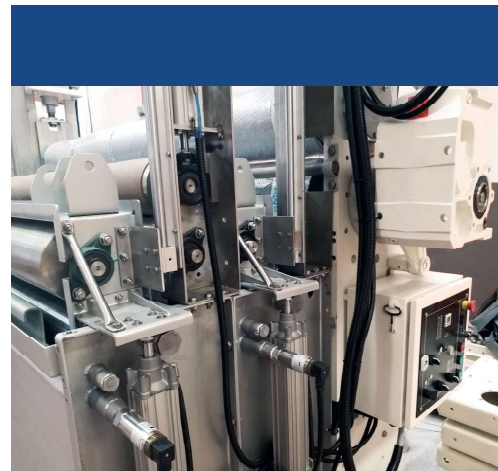
GENERATOR

Characteristics at a glance:

- determination of the optimum operating frequency even faster and more precisely.
- The combined frequency and amplitude modulation enables ideal cleaning results.
- voltage fluctuations are automatically compensated, thereby guaranteeing the highest level of operational reliability and process stability.
- complex functions and contents are communicated clearly and can be controlled directly.
- in the event of a service call, errors can be read via USB.
- frequency changes (dual and multifrequency models) can be performed during operation.

OTHER PROPERTIES

- Plug & Play
- Automatic degas mode
- Intelligent fan control
- Power output control from 10 to 100 per cent
- USB service interface
- Compact design, can be fitted in 19" casing
- 25-pole I/O interface
- Optional: PROFIBUS or PROFINET interface

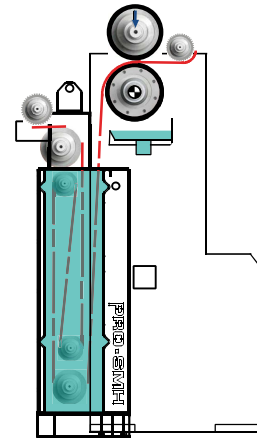
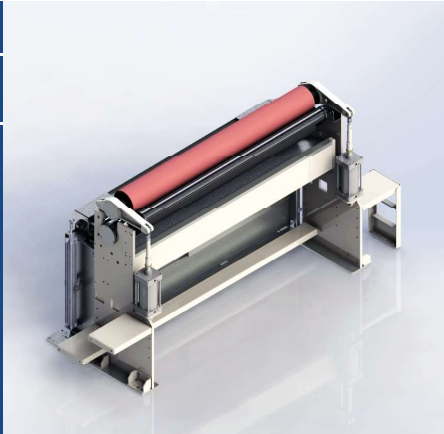


PRO-SONIC

- superior washing effect by means of ultrasonic
- space saving construction
- available with 1 or 2 bathes

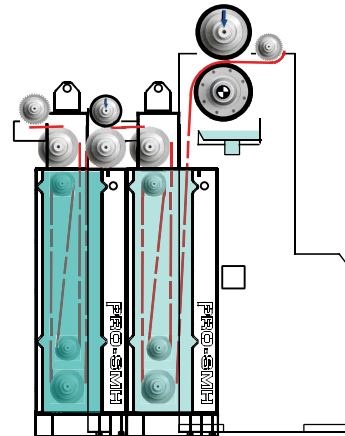
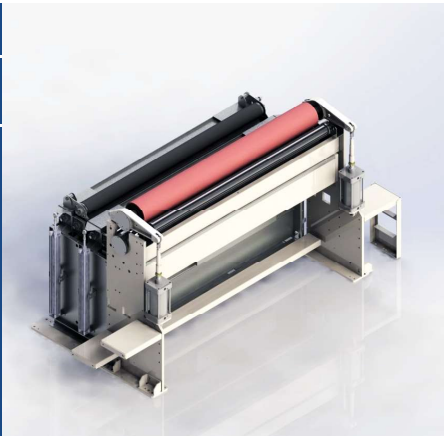
WASHING UNIT

TYPE **PRO-SONIC-1®**



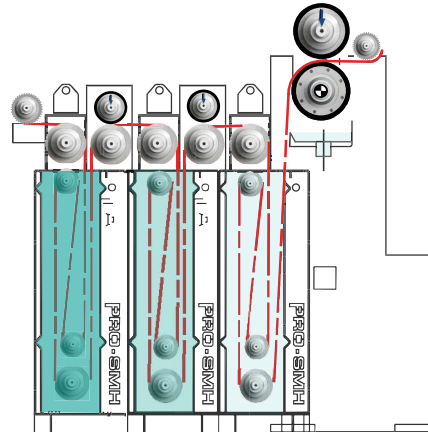
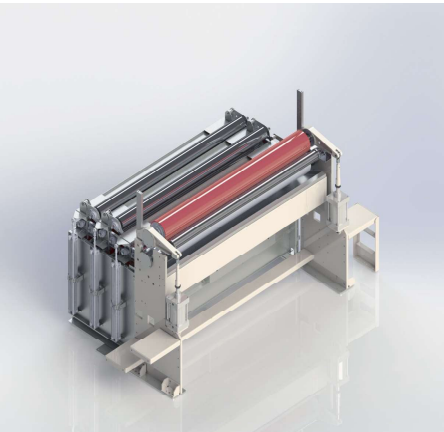
WASHING UNIT

TYPE **PRO-SONIC-2®**



WASHING UNIT

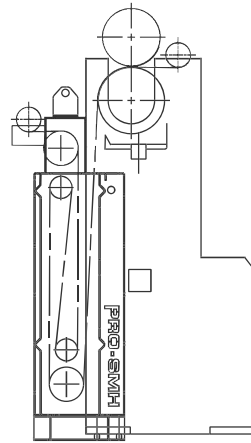
TYPE **PRO-SONIC-3®**



PRO-SONIC

WASHING UNIT

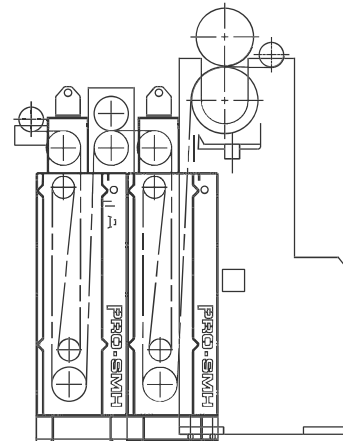
TYPE **PRO-SONIC-1®**



working width	1.800-3.600mm
number of bathes	1
fabric content	4,7m
liquor content	480l at ww2000mm
pressure main squeezer	10t

WASHING UNIT

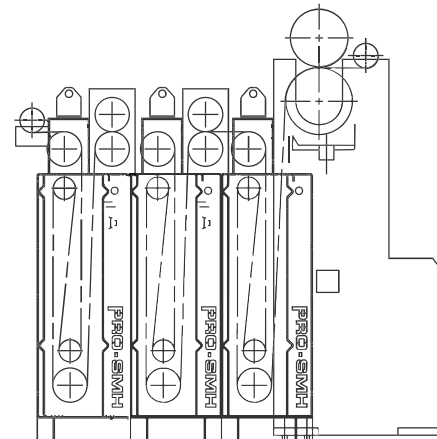
TYPE **PRO-SONIC-2®**



working width	1.800-3.600mm
number of bathes	2
fabric content	9,6m
liquor content	960l at ww2000mm
pressure main squeezer	10t

WASHING UNIT

TYPE **PRO-SONIC-3®**

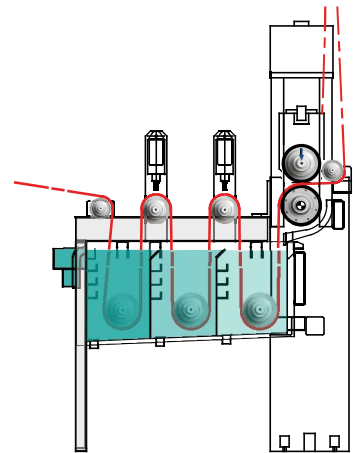
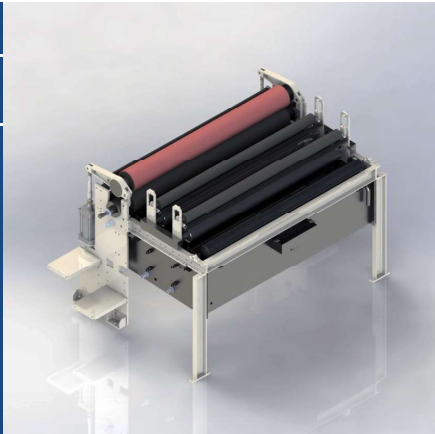


working width	1.800-3.600mm
number of bathes	3
fabric content	13,4m
liquor content	1.440l at ww2000mm
pressure main squeezer	10t

PRO-OPTIWASH

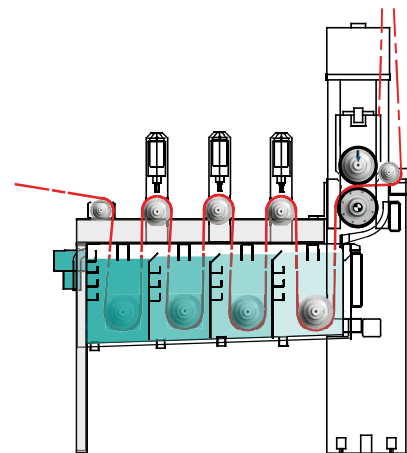
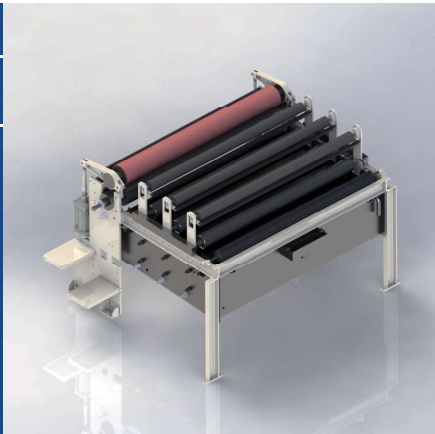
WASHING UNIT

TYPE **PRO-OPTIWASH-3[®]**



WASHING UNIT

TYPE **PRO-OPTIWASH-4[®]**



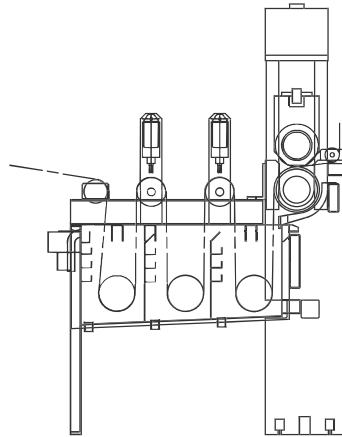
PRO-OPTIWASH

- superior washing performance with counter-flow
- circulation system for chemical treatment
- up to 35% reduction in water consumption
- available with 3 or 4 bathes

PRO-OPTIWASH

WASHING UNIT

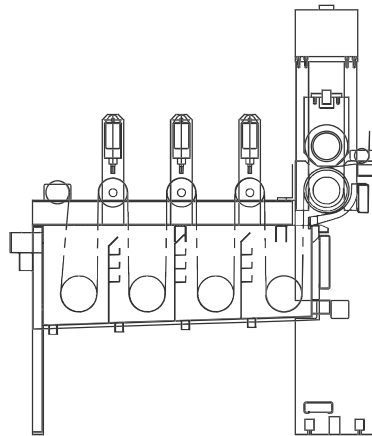
TYPE **PRO-OPTIWASH-3[®]**



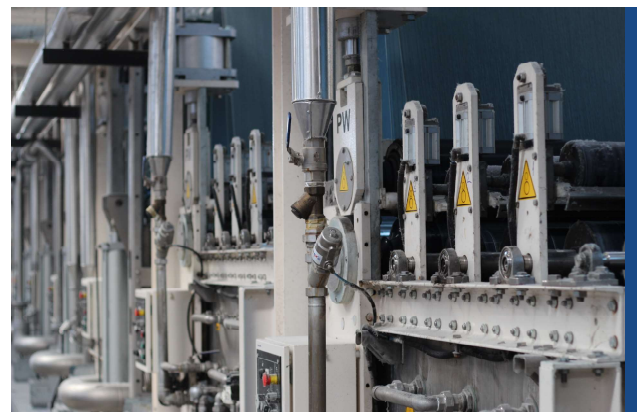
working width	1.800-2.200mm
number of bathes	3
fabric content	6,3m
liquor content	800l at ww2000mm
circulation	12m ³ /h
pressure main squeezer	10t

WASHING UNIT

TYPE **PRO-OPTIWASH-4[®]**



working width	1.800-2.200mm
number of bathes	4
fabric content	8,4m
liquor content	1.200l at ww2000mm
circulation	12m ³ /h
pressure main squeezer	10t



PRO-INNOWASH

The washing compartment PRO-INNOWASH with its various unit types and designs has been developed for ambitious washing processes of nearly all kind of woven fabrics. The washing principle separates the washing process into various separate and continuable stages. In each of the divided washing sections the contamination, dirt or/and chemical liquor in the fabric is exchanged between 40 to 80% for wash liquor, which is loaded commensurately with dirt and chemicals. The loaded liquor in and on the fabric will not be transported to the next wash section due to jockey rollers on top of the upper rollers. In the following washing chamber the liquor exchange is repeated but with a wash liquor of a certain lower dirt concentration.

PRO-INNOWASH



To increase the washing effect and to use every drop of wash liquor in the best way, the liquor is guided on the ground of the wash box by means of flow sheets located between each underliquor guide roller. Additionally the liquor is guided in counter-flow principle from the end of the washing-range to the front. PRO-SMH offers a wide range of PRO-INNOWASH washing compartment types which allows every customer to specify its washing-range concerning his own special demands.

PRO-INNOWASH

Flagship of the PRO-INNOWASH washing compartment family is the PRO-INNOWASH-DL32-JR5 washing box:

This washing unit is fitted with double loop cloth guiding and rubber covered jockey rollers and has a huge cloth content of 32m. This kind of washing box is especially recommended for middle heavy and heavy woven fabrics. All upper guiding rollers are driven individually by means of controlled A/C motors.

To prevent any creasings in the fabric run the guide rollers have huge diameters of 203/150mm and a driven spiral expander roller is located in the middle of the upper guiding roll row. In each washing section the fabric is immersed twice into the liquor. At the fabric return point of each underliquor roller the wash liquor forcibly is pressed through the fabric which results into a perfect liquor exchange between contaminated liquor in the fabric and the fresh wash liquor.

The intensive liquor exchange in the fabric is supported by the liquor film which is running back down along the fabric after pressed by the jockey roller. The side walls of all INNOWASH washing units are reinforced and made out of two stainless steel sheets each measuring 3mm in wall thickness. These sheets are affixed to each other by means of dot welding process. This kind of construction assures absolute stability of the whole compartment, absolute true running accuracy of the guiding rollers and a good heat insulation against loss of heat. PRO-INNOWASH washing compartment are available in various executions and with various cloth contents:

double or single loop execution, with or without jockey rollers, with or without separate A/C motors for the upper rollers and with fabric contents beginning from 10 to 20 up to 32m: in short, PRO-INNOWASH continuous washing-ranges can be assembled according customers individual requirements for its full satisfaction.



PRO-INNOWASH

■ THE STEAM-JET HEATING

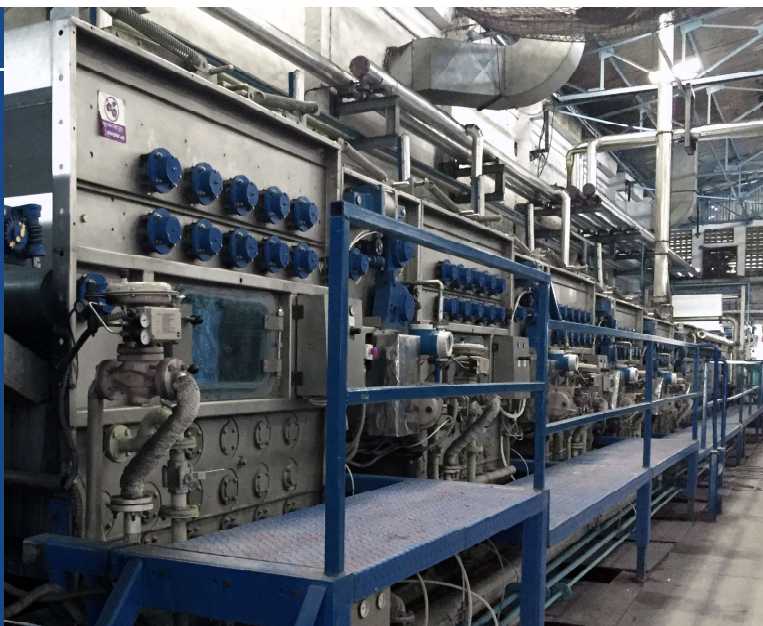
All PRO-INNOWASH washing compartments are fitted with a so-called steam-injector heating system. This kind of heater uses steam to raise the temperature of the wash liquor. The injector draws in cold wash liquid, mixes it with steam inside the injector and distributes the heated liquid in the tank. In comparison to the classical direct/indirect heating system, the steam injector system is made of 316 stainless steel, maintenance free and provides very fast, quiet, efficient and economic heating. The extreme high temperature ensures a fast and effective penetration of the liquor through the fabric. Moreover, this injector heating system avoids temperature stratification in tanks-maintains efficiency.



■ BEARINGS

All guiding rollers of the PRO-INNOWASH washing units are equipped with external bearings. All rollers are running in ball bearings which are installed outside of the washing compartment. Sealing is effected by means of special slide ring seals. Outside located bearings can be easily changed in case of need. The operating time in comparison to internal sealings is much more higher.

PRO-INNOWASH

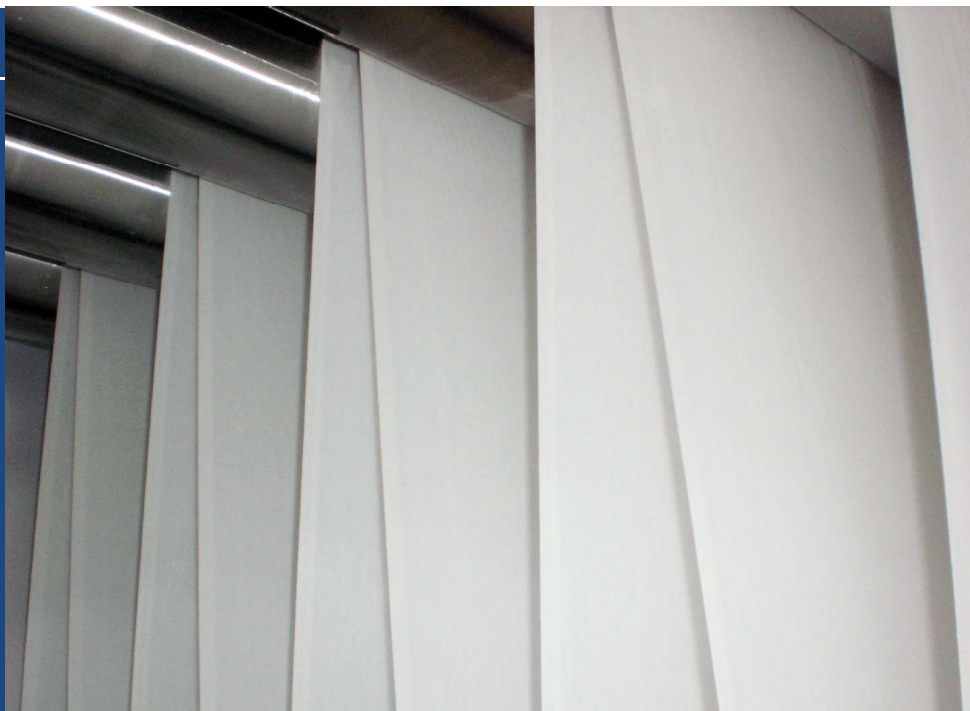


PRO-INNOWASH

■ WASH BOX VARIATIONS

In comparison to the double loop executed wash boxes the wash boxes with single loop execution works in the same way, optional with separate drives for the upper rollers and jockey rollers. Most disadvantage of the antiquated, single loop guide execution is that due to the fact that the fabric just dips once into liquor per each washing section. This leads to a less wash effect at same water amount and fabric weight. Less dwelling time has to be compensated by sufficient amount of washing compartments.

PRO-INNOWASH



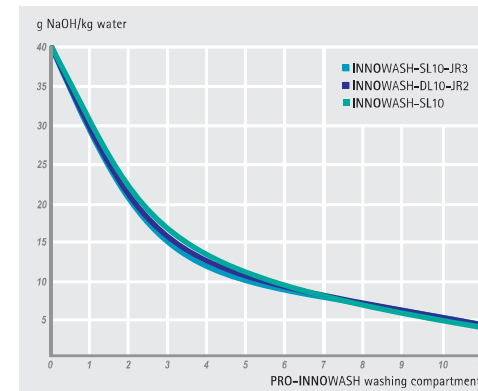
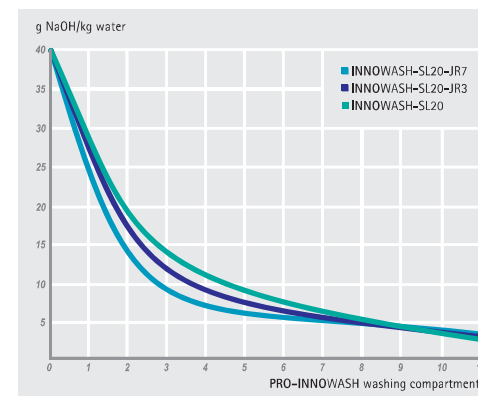
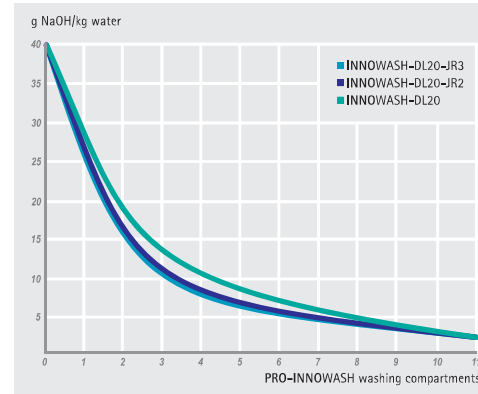
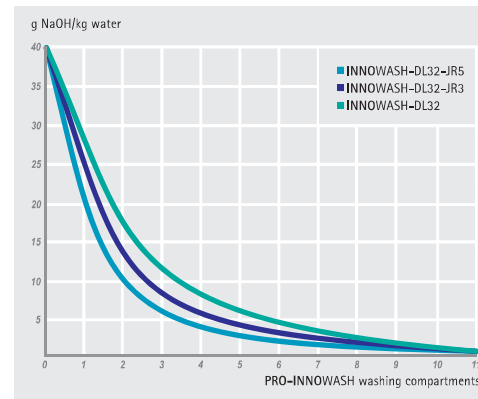
■ ESSENTIAL FEATURES

- self carrying stainless steel housing with re-inforced side walls of 6mm
- steam tightly closed execution due to swivable stainless steel covers
- all guide rollers are fitted with external bearings with special slide ring sealing
- drain valves pneumatically
- maintenance free steam injector heating for quick and constant heat up
- big roller diameter of 203mm ensure perfect fabric run without creases
- stainless steel water lock at in- and outlet
- all intermediate squeezers made in steamtightly closed construction with covers
- manual or automatic drum filter optionally

PRO-INNOWASH

■ COMPARISON OF WASHING EFFECTS

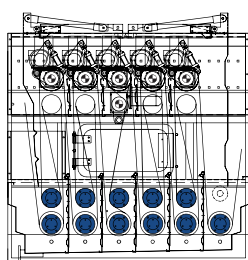
Numerous washing trials at customer side as well as also conclusions of our worldwide customers allocates the positive influence of jockey rollers and cloth content according washing effect. As you can see at the charts on the right and below, the best washing effect at the alkali washing process is achieved by using PRO-INNOWASH washing compartments with double loop fabric flow execution and maximum amount of jockey rollers. The flagship state of the art washing box, the PRO-INNOWASH-DL32-JR5 with double loop execution and 5 jockey rollers achieves the best result in washing effect, followed up by the same unit but fitted just with 3 jockey rollers instead of 5. By omitting all jockey rollers the washing effect gets more worse. Considering the wash effects of the smaller wash boxes PRO-INNOWASH with double loop execution and a fabric content of 20m and with or without jockey rollers on top of the upper driven rollers shows that the washing effect gets down indeed. Washing with the PRO-INNOWASH washing boxes with single loop fabric guide execution has the advantage of a better accessibility for cleaning purpose or for easy handling of the fabric in case of need. But as you can see at the charts a disadvantage is, that due to the fact that the fabric just dips once into liquor per each washing section, washing effect is negative effected and goes down in a dramatic way.



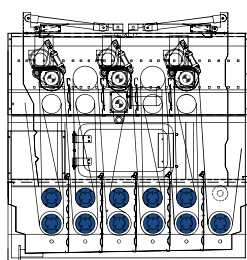
PRO-INNOWASH

TECHNICAL DATA

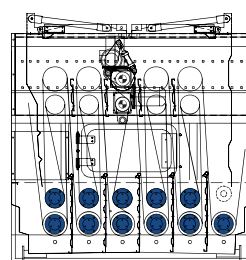
type of washing unit	INNOWASH-DL32-JR5	INNOWASH-DL32-JR3	INNOWASH-DL32	INNOWASH-DL20-JR5	INNOWASH-DL20-JR3	INNOWASH-DL20
working width	1600 - 3400mm	1600 - 3400mm	1600 - 3400mm	1600 - 3400mm	1600 - 3400mm	1600 - 3400mm
fabric content	32m	32m	32m	20m	20m	20m
roll diameter	203mm & 150mm	203mm & 150mm	203mm & 150mm	203mm & 150mm	203mm & 150mm	203mm & 150mm
nr. of jockey rolls	5	3	—	3	2	—
nr. of separate drives	5	3	1 / 3 / 5	3	2	2 / 3
bearings	external	external	external	external	external	external



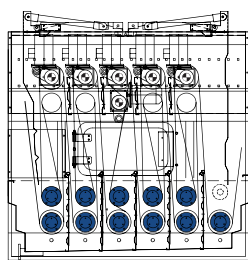
PRO-INNOWASH-DL32-JR5



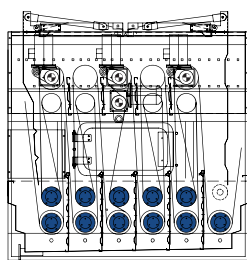
PRO-INNOWASH-DL32-JR3



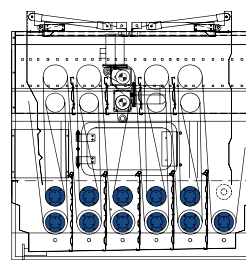
PRO-INNOWASH-DL32-neutralize



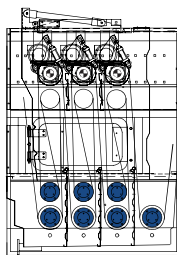
PRO-INNOWASH-DL32, 5 drives



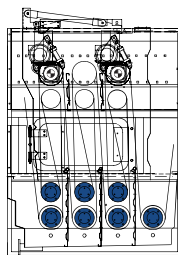
PRO-INNOWASH-DL32, 3 drives



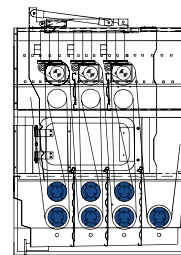
PRO-INNOWASH-DL32, 1 drive



PRO-INNOWASH-DL20-JR3



PRO-INNOWASH-DL20-JR2

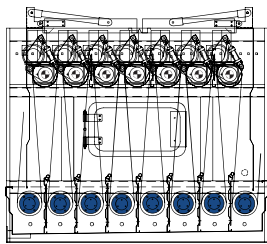


PRO-INNOWASH-DL20, 3 drives

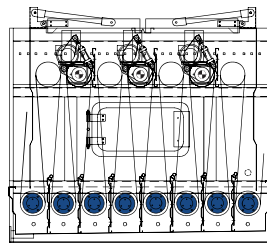
PRO-INNOWASH

TECHNICAL DATA

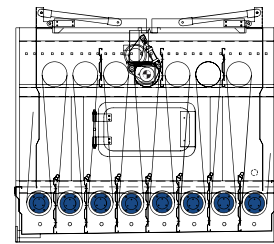
type of washing unit	INNOWASH-SL20-JR7	INNOWASH-SL20-JR3	INNOWASH-SL20	INNOWASH-SL10-JR3	INNOWASH-SL10-JR2	INNOWASH-SL10
working width	1600 - 3400mm	1600 - 3400mm	1600 - 3400mm	1600 - 3400mm	1600 - 3400mm	1600 - 3400mm
fabric content	20m	20m	20m	10m	10m	10m
roll diameter	203mm	203mm	203mm	203mm	203mm	203mm
nr. of jockey rolls	7	3	—	3	2	—
nr. of sepearate drives	7	3	3 / 7	3	2	0 / 2 / 3
bearings	external	external	external	external	external	external



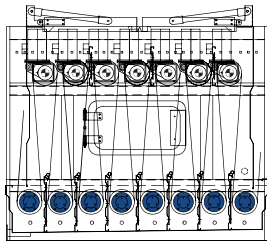
PRO-INNOWASH-SL20-JR7



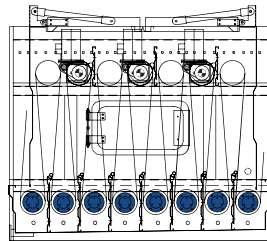
PRO-INNOWASH-SL20-JR3



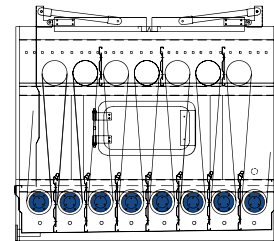
PRO-INNOWASH-SL20-neutralize



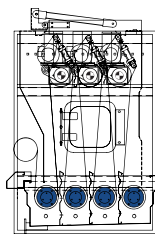
PRO-INNOWASH-SL20, 7 drives



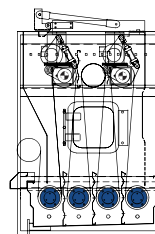
PRO-INNOWASH-SL20, 3 drives



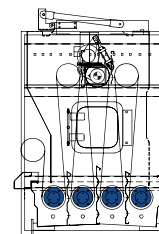
PRO-INNOWASH-SL20



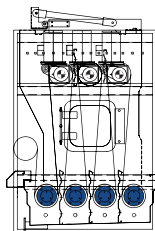
PRO-INNOWASH-SL10-JR3



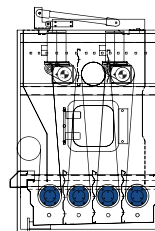
PRO-INNOWASH-SL10-JR2



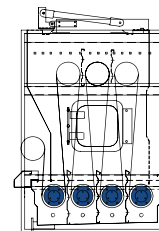
PRO-INNOWASH-SL10-JR1



PRO-INNOWASH-SL10, 3 drives



PRO-INNOWASH-SL10, 2 drives

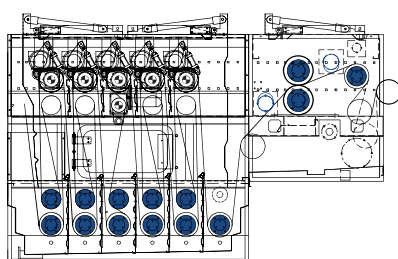


PRO-INNOWASH-SL10

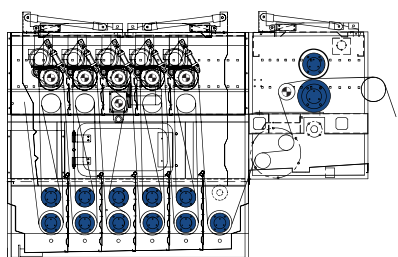
PRO-INNOSEP

TECHNICAL DATA

type of squeezing unit	INNOSEP-IM-CE	INNOSEP-IM-CE-KF
working width	1600 - 3400mm	1600 - 3400mm
diameter pressure roll	245mm	245mm
diameter supporting roll	245mm	245mm
linear pressure	20N/mm	20N/mm
type of compensator	pendulum compensator	turning compensator



PRO-INNOSEP-IM-CE



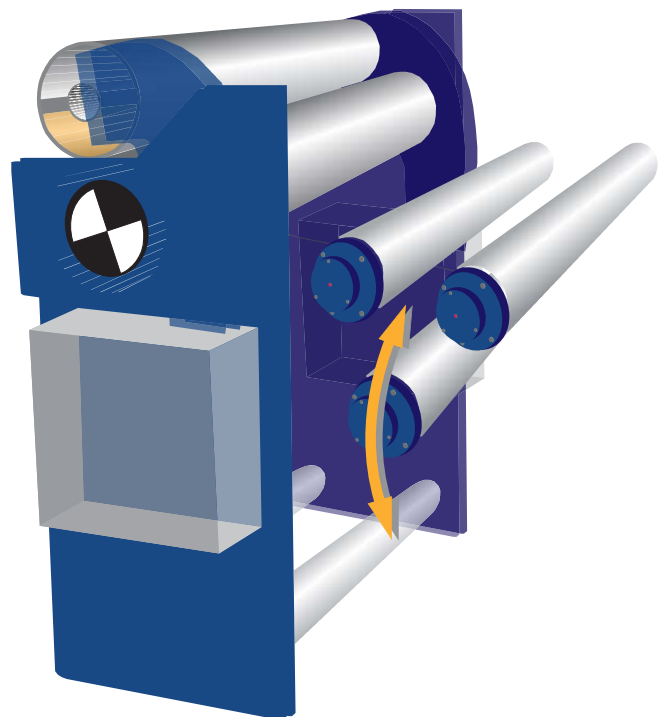
PRO-INNOSEP-IM-CE-KF

PRO-INNOSQUEEZE

■ THE DEFLECTION CONTROLLED ROLL

The high-efficiency squeezing unit has the function to dewater the liquor located in the fabric continuously over the full working width.

The more liquor is squeezed out of the fabric before it will be dried, the less moisture has to be evaporated in the following drying process. If pneumatic pressure is brought to the cones of a roll, the squeezing pressure in the center is lower as at the edges of the roll due to a soft deflection of the roller in the middle. Trials to compensate this deflection by means of bombage in the center of the rolls or by means of center supported rollers have the disadvantage, that in this vein a even squeezing effect is just to be adjustable and feasible at one certain pressure. Right for wide washing-ranges it is essential to achieve an absolute even squeezing effect with the final high-efficiency squeezing unit to avoid edge-center-edge moisture problems at the following drying process.



PRO-INNOSQUEEZE-HE-S-222.50/222.56 high-efficiency squeezer

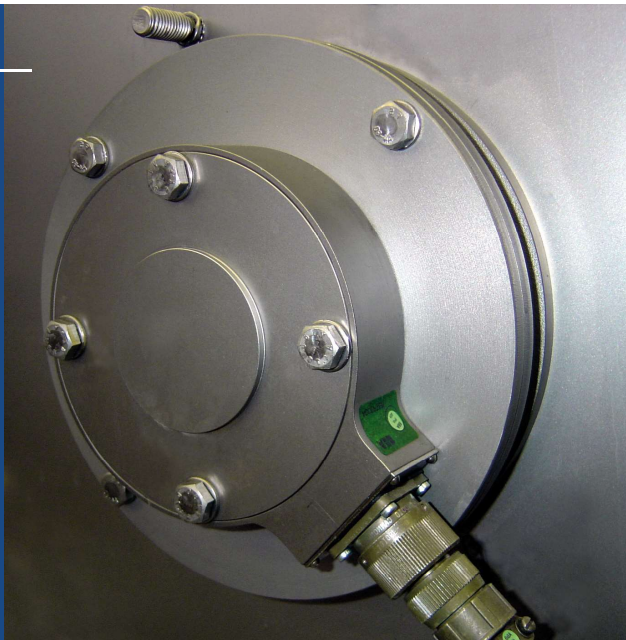
INNOCONTROL

■ THE DRIVE SYSTEM

All washing-ranges are characterised by particularly comfortable plant control and drive technology. All main drives are implemented as frequency controlled A/C-gear motors. As far as mechanical conditions permit they work as direct drives without mechanical intermediate drives.

The air-conditioned switch cabinet accommodates the electrical control units for all drives of the complete range. Likewise, the central control panel is equipped with an air-conditioning system. The central operating interface of the control panel can either be operated as a touch-screen or via mouse. Imported attributes such as presetting of fabric tension, quantity of water, chemical quantity defaults etc., can be made. A modem for remote service and maintenance of the range is certainly a standard feature. Frequency controllers can be offered standard from LENZE, ABB & SIEMENS and other systems.

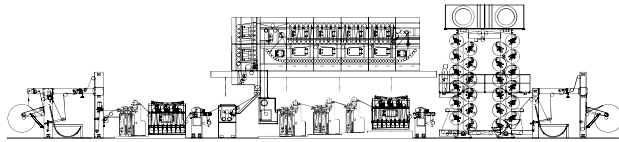
INNOWASH



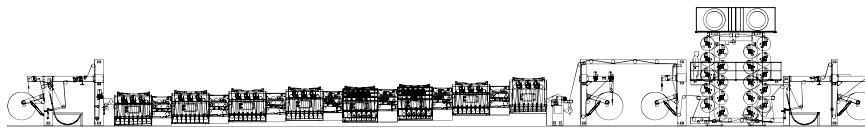
■ FREE FROM WRINKLES & CREASES

Large diameters for all guiding rollers of 203mm prevent a formation of wrinkles and lateral displacement of the fabric. This is supported by computer controlled fabric tension, easy running external bearings with low frictional resistance; frequency controlled spiral spreader rollers as well as short distances between the guiding rollers. Load cells with a very sensitive tension range as well as pendulum and turning compensators guarantee a passage free from creases and wrinkles.

LAYOUT WASHING-RANGES



PRO-SONIC-PRO-INNOWASH washing range for washing after Desizing & Continuous Bleaching



classic PRO-INNOWASH washing range for washing after CPB-Dyeing & reactive post printing



PRO-SONIC washing range for washing after mercerizing



PRO-SONIC-PRO-INNOWASH washing range for washing after CPB-Dyeing



PRO-SONIC washing range for scouring PV & PC fabrics

PRO-SMH

