



Optics



Ultrasonic Cleaning Systems for the Fine Cleaning of Precision Optics / Micro Optics / Infrared Optics

- Ready-for-inspection cleaning and ready-for-coating cleaning with customized and modular ultrasonic cleaning lines
- Bath care modules, specialized equipment, large range of accessories
- Serial units with various tank dimensions, also available with multi-frequency technology
- Elma cleaning chemicals, efficient and environment-friendly

Customer requirements



Stage of cleaning process (ready for inspection and / or ready for coating)



Cleaning process for the glass types has already been established



Cleaning process for the glass types has not yet been established



Cleaning lines

Elma configures the suitable cleaning line based on the required process (aqueous, semi-aqueous or in combination with solvents or HFE) and depending on the required throughput



Processes using Elma chemicals

In the Elma application laboratory our engineers cooperate with the customer to establish the individual cleaning process using Elma chemicals



The advantages at a glance

Customized cleaning units and cleaning lines for different glass types and depending on throughput requirements

Ultrasound with multi-frequency technology

Measuring systems for quality control and process optimization

Application laboratory for the perfect cleaning process

Cleaning chemicals developed and made by Elma

After Sales Service in Europe, the USA and Asia





Elma STC robot system

Single transport system – standardized cleaning system for large throughput rates and high cleaning demands



- standardized cleaning system at excellent price performance ratio
- 5 standard tank sizes (50, 100, 200, 350, 600 litre)
- variable cleaning processes with numerous options
- various process chambers (cleaning, rinsing with/without ultrasound)
- various drying systems (hot air, trough-shape or flow dryer, IR dryer)
- additional equipment available (vacuum dryer, wet loading tank, etc.)
- various bath care systems (pump-filter systems, oil separators, pure water units)
- control by industrial PC with intuitive visualization, remote control and remote maintenance possible, datalogger
- easy switching of languages (with special characters), integrated operating instructions
- Elma multi-frequency technology
- robust and proven components
- process-controlled production for validated stable production quality (datalogger)
- lower investment cost due to standardization

Elma MTC Lift-Push system

Multiple transport system – fully automatic standard systems in various sizes for cleaning jobs requiring a high throughput



- Lift-Push technology allows high throughput rates
- 3 standard chamber sizes (50, 100, 200 litre)
- other features: see STC systems



NA 300/400/360/8-WLT

Type: Robot device for the cleaning ready for coating
Cleaning product: Fine optical elements and mounted trinovid prisms with air gap
Pollution: Dust, grease, fingerprints
Cleaning result: Final cleaning before assembly
Process: Aqueous system with hot air drying
Cleaning chemicals: elma clean products
Throughput: Different according to parts to clean
Fixed cycle: 90 sec/batch, Transport: Robot in turning operation
Periphery: Clean water circulation equipment Machine speciality. Automatic basket locking system at the robot device for the fast basket transportation between the process chambers



NA 300/300/400/10-ALR

Type: Robot device for the cleaning ready for coating
Cleaning product: Lenses for endoscopes
Pollution: Dust, fingerprints, residues of protective lacquers
Cleaning result: Final cleaning before assembly
Process: Semi-aqueous based system with centrifugal drying
Cleaning chemicals: NEP and elma clean products
Throughput: 10 batches/day
Transport: Robot with rotation drive
Periphery: Clean water circulation equipment
Machine speciality: Robot device with rotation drive for the transportation of disc carriers through the process chambers resp. for the drying of the products by centrifugal technology



HSO 350/350/300/9-WLT

Type: Push-Lift device for the cleaning ready for coating
Cleaning product: Fine optical elements and prism
Pollution: Fillers, grinding oil, dust, fingerprints
Cleaning result: Final cleaning before assembly
Process: Aqueous system with hot air drying
Cleaning chemicals: elma clean products
Throughput: 5 – 12 batches/h
Transport: Lift-Push technology
Periphery: Clean water circulation equipment
Machine speciality: Twin-section device for the separate transportation of the products from the individual process steps



X-tra pre 550-7-WLT-F-R

Type: Modular cleaning line with transport robot for final inspection before coating
Cleaning product: Precision optics
Material: Lenses
Pollution: Protective lacquers, polishing media, dust, fingerprints
Process: Semi-aqueous with hot air drying and clean room filter
Cleaning chemicals: elma clean 275 d&s and elma clean 260 d&s
Periphery: Clean water circulation equipment
Throughput: 30 batches/h



X-tra pre 550-8-WLT-R

Type: Modular cleaning line with transport robot for final inspection before coating; cleaning line with partial casing and laminar flow
Cleaning product: Precision optics
Material: Lenses and prisms
Pollution: Dust, fingerprints
Process: Aqueous with hot air drying and clean room filter
Cleaning chemicals: elma clean 270 d&s and elma clean 260 d&s
Periphery: Clean water circulation with cooling



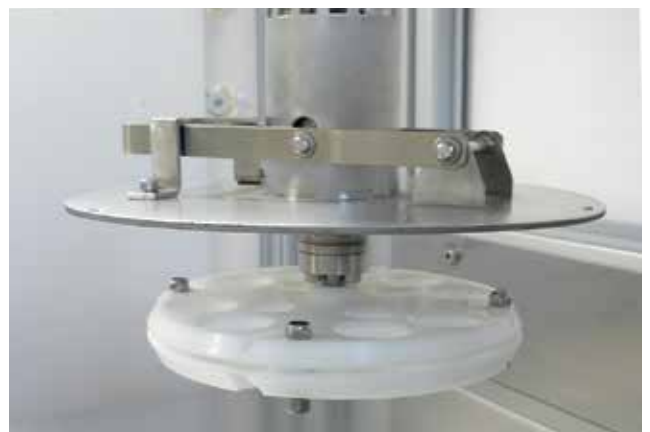
X-tra pre 300-7-WLT-F-R

Type: Modular cleaning line with transport robot for final inspection before assembly;
cleaning line with partial casing and laminar flow
Cleaning product: Precision optics
Material: Lenses
Pollution: Dust, fingerprints
Process: Aqueous with hot air drying and clean room filter
Cleaning chemicals: elma clean 270 d&s and elma clean 260 d&s
Periphery: Clean water circulation equipment
Machine speciality: Additional vertical rotation device to take very small optics



Vertical rotation device

Transport robot for the cleaning of very small optics (micro optics) which cannot be placed and fixed in a cleaning basket.



Elmasonic X-tra line pro for the cleaning ready for inspect

Individual solutions with Elma serial components,
from manual up to fully automatic cleaning lines



- available in 5 different unit sizes: 300, 550, 800 (manual and automatic), 1200, 1600 (manual); (X-tra LSM units for the pre-cleaning with solvents can be integrated)
- multi-frequency technology (25/45 kHz or 35/130 kHz)
- expandable by numerous peripheral units and equipment (automatic loading and unloading belt, dosing systems, digital temperature monitoring, Lift-out, filter-pump unit, oil separator, etc.)
- flexible structures and cleaning procedures to adjust to various cleaning tasks
- well proven and reliable components
- graphic control system (with automatic transport robot)
- control by industrial PC (optional) with visualization
- remote control possible
- simple change of control language
- integrated operating instructions
- process-controlled production to guarantee a constant productional quality (data logger)
- adjustment of investment costs to shorter product lifetimes
- flexible integration of the cleaning line into existing production processes
- short delivery times due to modular system





Tanks with rounded corners,
electro-polished surfaces



Optional: infrared or hot air dryer



Safe, IR welded piping

Elmasonic X-tra line precision for the cleaning ready for coating

Multi-frequency cleaning line for fine cleaning applications before inspection and coating in the optical industry

- 3 different tank sizes: X-tra line precision 300, 550 and 800
- multi-frequency technology: 25/45 kHz or 35/130 kHz
- the tanks have rounded corners, electro-polished surfaces and a specially designed piping to optimize the draining of liquid residues and to prevent entrainment
- special peripheral units for finest cleaning tasks
 - hot air dryer with special particle filter
 - IR dryer
 - casing in laminar flow boxes for cleaning under clean room conditions
- manual or automatic robot systems
- individual carriers
- modular system, variable to fit changed requirements
- operating screen with visualization to control and monitor the process
- datalogger can be integrated in IPC control
- bar code scanner for order entry
- remote maintenance of software via VPN connection
- short delivery times
- Plug & Clean technology



Dryer WLT, VTD,IR

Hot air dryer, vacuum dryer, infrared dryer



- user-friendly loading from the top
- digital display of set and actual temperature
- very safe due to integrated limit temperature monitor
- casing and inner chamber made of stainless steel
- extremely short drying period

Oil separators

ÖA100 and ÖA200



- bath care for oil emulsions
- prolonged service life
- increased cleaning power
- stable bath quality, therefore constant cleaning results
- lower consumption of fresh water and energy
- low consumption of chemicals
- increased bath capacity

Elmapur

Water processing units



Water processing units for the creation of softened tap water, re-osmosis water or pure water for recirculation systems in various sizes between 100 and 2400 l/h.

Elmasonic X-tra LSM

for the cleaning in flammable and aqueous liquids



- 2 unit sizes: 250 and 550
- multi-frequency technology
- integrated explosion protection against the forming of an explosive atmosphere (primary explosion protection)
- TÜV-certification for the use of solvents
- good for the use of solvents with flashpoint >55 °C
- permanent operation possible due to cooling device for a constant operating temperature
- Occupational exposure limits are kept due to optional suction device
- units can be integrated into existing X-tra Line



Pump-filter units for the continued bath care of cleaning and rinsing baths.



Processing of solvent by separation of dirt particles, e.g. fillers, pitches, protective lacquers.

All from one source

From table-top unit to custom-made robot installation



Elmasonic P table-top unit



Elmasonic S 60 and S 60 H



Practical accessories

Elmasonic S

Ultrasonic table-top units with state-of-the-art technology

The product programme ranging from individual units via modular add-on cleaning lines to custom-made special industrial cleaning installations provides the perfect solution for each fine cleaning problem at an excellent price performance ratio.

Elma has its own chemical laboratory to test and establish high-quality cleaning processes. The advantages: process, chemicals, units, cleaning technology and service – all from one source made by Elma.



unit sizes from 0.8 to 90 litre

Elmasonic P

The most professional way of using ultrasound

Digital display, self-explanatory, all data clearly arranged, set and actual values easy to monitor. Very easy to operate with all parameters at a glance.

2 frequencies (switchable) in one unit:
 37 kHz – for the removal of coarse contamination
 80 kHz – silent, ideal for quiet work areas, with prolonged process time.

The advantages at a glance

- perfect quality and long service life
- short cleaning period due to strong ultrasonic power
- modern and functional design
- intensive and gentle cleaning at 37 kHz with Elma performance transducers
- uniform cleaning due to electronic sound field oscillation (Sweep)
- quick degassing (Degas / Autodegas)
- electronic time and temperature control
- temperature-controlled autorun
- ceramic heating elements, safe to run dry
- 13 different sizes – 0.8 to 90 litre – the perfect unit for each cleaning job
- large range of special accessories

Cleaning with ultrasound – today one of the best cleaning technologies: ecological, economical, intensive and gentle

Ultrasound reduces the cleaning period by up to 90%!

Ultrasound is the term used for vibrations that cannot be perceived by the human ear (>20 kHz). For cleaning, vibrations between 20 and 130 kHz are applied. Transducer elements mounted to the bottom of a cleaning tank transmit high and low pressure waves into the liquid. At a certain level of vibrations the compound structure of the liquid tears and vacuum bubbles of sizes in the nano range are created. These



bubbles implode close to the surfaces of immersed cleaning items thereby directing a pressure jet toward surfaces

of the cleaning items. This process is called cavitation. It removes dirt particles both gently and thoroughly from all parts that are completely immersed, even from the tiniest grooves or bore holes. In particular, cleaning items of



complicated geometric shape and hollow parts are cleaned, which is where cleaning jets or manual

cleaning methods fail.

Multi-frequency technology

The development of multi-frequency units by Elma is a masterpiece of technical engineering. Multi-frequency units are fitted with a single transducer system that can produce two different ultrasonic frequencies. So two different materials can be cleaned in the same cleaning tank: sensitive surfaces can be treated with high frequencies, and robust pieces can be cleaned with low frequencies.

Only the right cleaning procedure yields a perfect result

Elma researches and develops the optimized cleaning procedure in their own application laboratory. Each new cleaning problem is regarded as a challenge which is generally addressed in cooperation with the customer.



The technical equipment provided in the Elma application laboratory is of the highest standard and includes the latest cleaning technologies for ultrasonic, spray and steam jet cleaning, for rinsing and for drying. Even clean room conditions can be simulated.



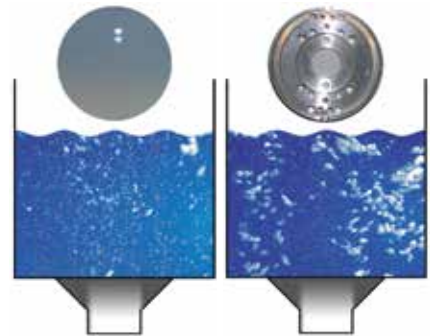
Finding a solution for a difficult cleaning problem satisfies the customer and proves the high quality of Elma technology and Elma service to him.

The cleaning chemicals are formulated and produced individually for each cleaning task, so quite often a new cleaning problem leads to the production and distribution of a new cleaning product.

Each year, Elma carries out numerous cleaning tests ranging from simple processes to highly complex cleaning arrangements, which provide solutions with serial units or which generate new processes for the Elma cleaning lines.



The cleaning problem is always the core issue, and the Elma customers appreciate the commitment with which it is solved.



The Elma Kavimeter

Mobile system for the measuring of the cavitation; for validation and quality control of ultrasonic cleaning lines and units

What the Kavimeter does

Measuring of the following ultrasonic parameters: frequency, sound pressure and signal form; measuring and evaluation of the cavitation noise; calculation of the cavitation intensity and the power density of ultrasonic equipment in cleaning lines and units

Applications

Measuring and setting of the required ultrasonic parameters in process chambers; measuring and recording of the ultrasonic parameters for validation and quality control of cleaning systems in production processes

Cleaning concentrates for the aqueous cleaning of precision & infrared optics

Optical elements (frameless)					
Kind of parts	Preceding process step	Contaminations supposed to be removed	Cleaning agent	Properties of application	Concentration; pH-value
Elements from mineral glass ^{*)}	Cleaning ready for inspection				
Glass types insensitive to alkaline media	Solvent-based removal of protective laquer, putty, pitch & (if necessary) adhesive	Residues of colophonium-based protective laquer, putty & pitch, of grinding & polishing suspension, fingerprints, dust	elma clean 275 dip& splash (EC 275 d&s)	For ultrasonic dip- (1-2 vol%) and for splash- (0.5-1 vol%, >55°C) cleaning, KOH-based, predominantly demulsifying	0.5 - 2 vol%; alkaline; pH: 12 - 12,7
Glass types moderately sensitive to alkaline media	Solvent-based removal of protective laquer, putty, pitch & (if necessary) adhesive	Traces of colophonium-based protective laquer & putty, of grinding & polishing suspension, fingerprints, dust	elma clean 270 dip& splash (EC 270 d&s)	For ultrasonic dip- (1-2 vol%) and for splash- (0.5-1 vol%, >55°C) cleaning, KOH-based predominantly demulsifying	0.5 - 2 vol%; mildly alkaline; pH: 9 - 10
Also glass types very sensitive to alkaline media	Solvent-based removal of protective laquer, putty, pitch & (if necessary) adhesive	Traces of colophonium-based protective laquer & putty, of grinding & polishing suspension, lime soaps, fingerprints, dust	elma clean 260 dip& splash (EC 260 d&s)	For ultrasonic dip- (1-2 vol%) and for splash- (0.5-1 vol%, >55°C) cleaning, predominantly demulsifying	0.5 - 2 vol%; neutral; pH: 7 - 8
Glass types moderately sensitive to alkaline media	Solvent-based removal of protective laquer, putty, pitch, adhesive	Residues of grinding & polishing suspension, lime soaps, fingerprints, dust	elma clean 290 surfactant-free (EC 290 tf)	For the surfactant-free dip- & splash-cleaning, demulsifying	0.5-2 vol%; alkaline; pH: -11
Cleaning ready for coating					
Glass types insensitive to alkaline media	Cleaning ready for inspection, inspection	Dirt after storage, fingerprints, dust	elma clean 275 dip& splash (EC 275 d&s)	For ultrasonic dip- (-1 vol%) and for splash- (-0.5 vol%, >55°C) cleaning, KOH-based, predominantly demulsifying	0.5 - 1 vol%; alkaline; pH: 12 - 12,4
Glass types moderately sensitive to alkaline media	Cleaning ready for inspection, inspection	Dirt after storage, lime soaps (drying spots), fingerprints, dust	elma clean 270 dip& splash (EC 270 d&s)	For ultrasonic dip- (-1 vol%) and for splash- (-0.5 vol%, >55°C) cleaning, KOH-based predominantly demulsifying	0.5 - 1 vol%; mildly alkaline; pH: 9 - 9,7
Also glass types very sensitive to alkaline media	Cleaning ready for inspection, inspection	Dirt after storage, lime soaps (drying spots), fingerprints, dust	elma clean 260 dip& splash (EC 260 d&s)	For ultrasonic dip- (-1 vol%) and for splash- (-0.5 vol%, >55°C) cleaning, predominantly demulsifying	0.5 - 1 vol%; neutral; pH: 7 - 8

^{*)} If a given mineral glass could be cleaned in aqueous media or not, depends on its chemical resistances to pure water (DI-water rinsing steps) and to the alkaline or acidic cleaning solutions. These are given e. g. by their Schott-indexes against acidic (SR, ISO 8424:1987) and alkaline (AR, ISO 10629: 1996) aqueous media and other indexes. Thus, e. g. a mineral glass with SR > 52 requires special measures for the rinsing with deionized water (temperatures < 20°C a. s. o.) or this glass can not be rinsed in deionized water at all. The coefficient of thermal expansion of the glass has to be considered for DT-jumps between processing steps.

Optical elements (frameless)					
Kind of parts	Preceding process step	Contaminations supposed to be removed	Cleaning agent	Properties of application	Concentration; pH-value
Elements of Infrared optics	Cleaning ready for inspection				
Ge, CaF2	Solvent-based removal of protective laquer, pitch & putty	Residues of grinding & polishing suspension, storage dirt, fingerprints, dust	elma clean 275 dip& splash (EC 275 d&s)	For ultrasonic dip- (1-2 vol%) and for splash- (0.5-1 vol%, >55°C) cleaning, KOH-based, predominantly demulsifying	0.5 - 2 vol%; alkaline; pH: 12 - 12,7
Si ²⁾ , other glass types moderately sensitive to alkaline media	Solvent-based removal of protective laquer, pitch & putty	Traces of colophonium-based protective laquer & putty, of grinding & polishing suspension, fingerprints, dust	elma clean 270 dip& splash (EC 270 d&s)	For ultrasonic dip- (1-2 vol%) and for splash- (0.5-1 vol%, >55°C) cleaning, KOH-based predominantly demulsifying	0.5 - 2 vol%; mildly alkaline; pH: 9 - 10
Al ³⁾ , Cu/Ni ³⁾ , Ge, Si, ZnS (Cleartran), ZnSe, AMTIR, CaF2	Solvent-based removal of protective laquer, pitch & putty	Traces of colophonium-based protective laquer & putty; grinding & polishing suspension, lime soaps, fingerprints, dust	elma clean 260 dip& splash (EC 260 d&s)	For ultrasonic dip- (1-2 vol%) and for splash- (0.5-1 vol%, >55°C) cleaning, predominantly demulsifying	0.5 - 2 vol%; neutral; pH: 7 - 8
Cleaning ready for coating					
Ge, CaF2	Cleaning ready for inspection, inspection	Dirt after storage, fingerprints, dust	elma clean 275 dip& splash (EC 275 d&s)	For ultrasonic dip- (-1 vol%) and for splash- (-0.5 vol%, >55°C) cleaning, KOH-based, predominantly demulsifying	0.5 - 1 vol%; alkaline; pH: 12 - 12,4
Si ²⁾ , other glass types moderately sensitive to alkaline media	Cleaning ready for inspection, inspection	Fingerprints, dust	elma clean 270 dip& splash (EC 270 d&s)	For ultrasonic dip- (-1 vol%) and for splash- (-0.5 vol%, >55°C) cleaning, KOH-based predominantly demulsifying	0.5 - 1 vol%; mildly alkaline; pH: 9 - 9,7
Al ³⁾ , Cu/Ni ³⁾ , Ge, Si, ZnS (Cleartran), ZnSe, AMTIR, CaF2	Cleaning ready for inspection, inspection	Dirt after storage, lime soaps (drying spots), fingerprints, dust	elma clean 260 dip& splash (EC 260 d&s)	For ultrasonic dip- (-1 vol%) and for splash- (-0.5 vol%, >55°C) cleaning, predominantly demulsifying	0.5 - 1 vol%; neutral; pH: 7 - 8

²⁾ An alkaline cleaning of Si-elements includes etching. This should be restricted by limiting the dipping time to a thinning of the outermost SiO₂-layer only.

³⁾ Ultrasonic treatment of Aluminium-mirrors requires higher ultrasonic frequencies and restricted ultrasonic power. For Cu/Ni-mirrors this holds also, but to a lower extent.

Framed optics / optical assemblies					
Kind of parts	Preceding process step	Contaminations supposed to be removed	Cleaning agent	Properties of application	Concentration; pH-value
Frames & elements from mineral glass ^{*)}	Cleaning ready for assembling				
Frames & glass types insensitive to alkaline media	Framing, preassembling with cleaned elements, sticking	Residues of adhesive (not cured), oil, grease, storage dirt, fingerprints, dust	elma clean 275 dip& splash (EC 275 d&s)	For ultrasonic dip- (-1 vol%) and for splash- (-0.5 vol%, >55°C) cleaning, KOH-based, predominantly demulsifying	0.5 - 1 vol%; alkaline; pH: 12 - 12,4.
Also glass types & frames sensitive to alkaline media	Framing, preassembling with cleaned elements, sticking	Traces of adhesive (not cured), oil, grease, storage dirt, fingerprints, dust	elma clean 225 sonic (EC 225sonic)	For the ultrasonic dip-cleaning, emulsifying	2 - 10 vol%; mildly alkaline, pH: 9-10.
Also glass types & frames sensitive to alkaline media	Framing, preassembling with cleaned elements, sticking	Traces of adhesive (not cured), oil, grease, storage dirt, fingerprints, dust	elma clean 225 spray (EC 225spray)	For splash-cleaning (>55°C), emulsifying	1 - 3 vol%; mildly alkaline, pH: 9-9.5.
Glass types & frames very sensitive to alkaline media	Framing, preassembling with cleaned elements, sticking	Traces of adhesive (not cured), lime soaps, fingerprints, dust	elma clean 260 dip& splash (EC 260 d&s)	For ultrasonic dip- (-1 vol%) and for splash- (-0.5 vol%, >55°C) cleaning, predominantly demulsifying	0.5 - 1 vol%; neutral; pH: 7 - 8.
Glass types & frames insensitive to alkaline media	Framing, preassembling with cleaned elements, sticking	Lime soaps, fingerprints, dust	elma clean 290 surfactant-free (EC 290 tf)	For the surfactant-free dip- & splash-cleaning, demulsifying	0.5 - 2 vol%; alkaline; pH: -11.

Ultrasonic Cleaning Technology · Appliances · Cleaning Media



The name Elma stands for quality and know-how in all sectors where cleaning processes and cleaning technology are required – and it has done so for more than 50 years now. The basis of the company's success is the ultrasonic technology.

The Elma product range for ultrasonic cleaning is the largest worldwide, both with regard to serial units and standardized or special customized cleaning lines. Based on its long-term experience, its innovative development and the specialized know-how, Elma manufactures and supplies top

of the range technology for all sorts of cleaning jobs. This is what has made Elma famous as supplier of solutions to all sorts of cleaning problems all over the world, even for the most crucial cleaning tasks. But the high quality standard does not end with developing and manufacturing equipment and appliances: a perfect service and round-the-clock technical support complete the excellent general picture. Elma also develops and produces a number of specialized equipment for the watch and jewellery business sector.

The cleaning chemicals, developed for various cleaning purposes in the Elma application laboratory, are an important part of the Elma product range. Today, Elma employs more than 200 people; the company is certified according to DIN EN 9001 and focuses on reliability and close cooperation with the customers. "Made by Elma Germany" – that's the underlying principle which guarantees motivation, precision, quality and a constant enthusiasm for new developments.



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