



FEDEGARI
GROUP

PASSION
THAT DRIVES
PERFORMANCES.

WASHINGSOLUTIONS





WASHING SOLUTIONS

Fedegari offers a wide range of innovative solutions and full support on cleaning process optimization to meet the most demanding requirements:

Industrial

GMP solutions

For Pharma, Cosmetics and Food industries

FOWS

Washer-sterilizers



FWS

Eco-steam Washer



Laboratory

GLP solutions

FGW

Glassware Lab Washer





COST-EFFECTIVE INTEGRATED SOLUTIONS

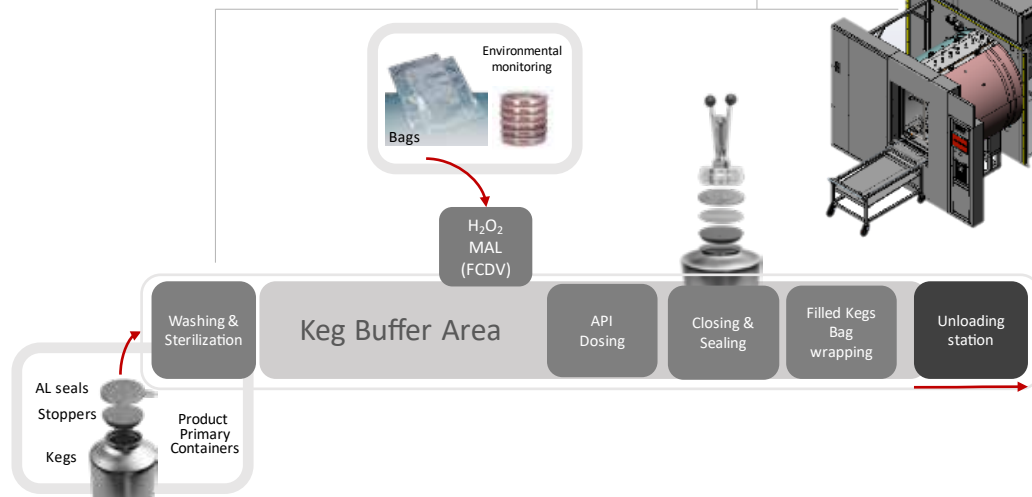
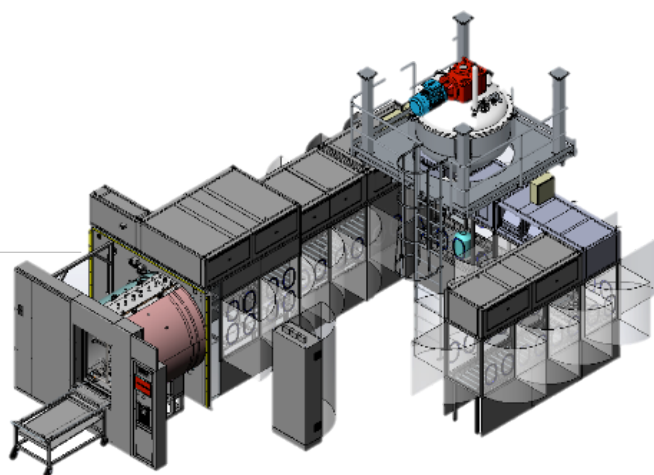
Fedegari Group provides integrated solutions in process equipment and turn-key projects combining different process machines with robotized handling systems for fully automatic high-throughput manufacturing lines.

Some examples of process integration

FOWS + FCIS + FCDV

Washer-sterilizer + RABS + Material Air-lock

Clean areas require strict contamination control due to highly critical operations performed within this environment. An integrated approach to operations inside clean areas leads to the concept of process optimization and cost-effective manufacturing.



FWS + FHPV

Washer + Decontamination

For specific applications of decontamination processes the FOWS/FWS machines can be integrated with FHPV - *Fedegari Hydrogen Peroxide Vaporizer*. The control and parameterization of FHPV is managed through the same Thema4 controller used to run the unit.



All the processes are managed and controlled by **Thema4** and can be integrated with the customer SCADA & MES systems.



FWS ECO-STEAM WASHER

Fedegari high-performance GMP Steam Washers capitalize on the experience acquired with the FOWS-series of washer-sterilizers in the pharmaceutical market. These machines represent a cost-effective solution for the highest performances. Fedegari steam washers, in fact, use steam (through a generator or utility line) to optimize performances reducing operating costs.

The FWS state-of-the art modular customizable rack can be easily adapted to every specific load configurations.

Extreme Washing Performances

A close loop piping recirculates water without the need of a buffer tank. Steam injection during pre-washing softens most of the soil thus reducing the detergents typically needed, as well as utilities and energy in general.

As every other process equipment manufactured by Fedegari, the FWS-Washers run on Thema4 process controller. A conductivity meter controls the process to terminate the washing/rinsing Phase when the desired setpoint is reached.

A 0,22 µm Hydrophobic sterile filter cartridge together with a HEPA filter (H14) allow sterile air injection for improved drying. All these unique and original eco-friendly solutions make the FWS-Washers the most cost-effective machines in this category.

DIRECT STEAM INJECTION

In the water basin

in the chamber

Heating Element

Softening Effect

No electric heaters inside the chamber

Cleaner surfaces and easier maintenance

Disinfection treatment	CFU Log reductions (average for 20 samples)
Water	3.9
Steam	5.5

Water vs. steam

In comparative tests carried out by Fedegari R&D laboratory*, steam has proven to be more effective in reducing microbial contamination.

Disinfection through steam is the recommended treatment for achieving higher bio-burden log reductions.

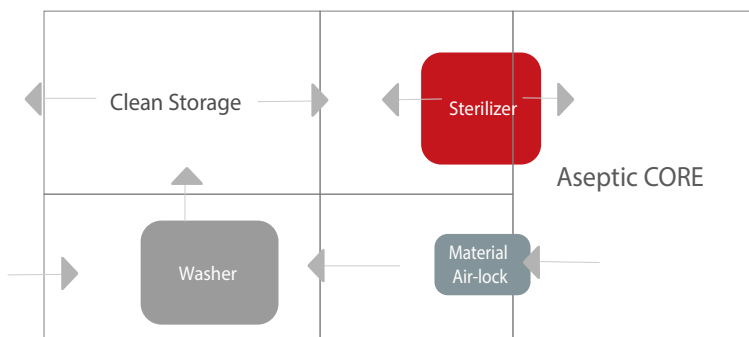
* The study is available under request.



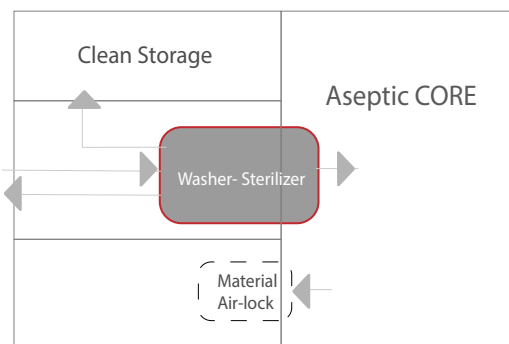
FOWS W A S H E R S T E R I L I Z E R

FOWS is not just a dual machine but an innovative multipurpose, flexible system capable of operating in different modes and offering a cost-effective solution where both cleaning and/or sterilization processes are needed. It is capable of washing, decontaminating*, sterilizing and drying various types of loads in one single process or even just single sub-processes as no traditional machine can ever do. FOWS brings in fact features and performances typical of a steam sterilizer into a jet washer. It uses steam for improving washing/degreasing performances and vacuum for drying thus being a more environmental friendly machine with lower energy consumption than any traditional alternative.

Traditional Approach



Fedegari Approach



Unique Advantages



- Reduction of the number of installed machines
- Reduction of floorspace needed
- Reduction of total process time
- Reduction of installation, qualification, maintenance, revalidation and personnel training costs
- Simplification of procedures and process (it is possible to develop and validate the entire process)

- Optimization of the production layout
- Optimization of material flows, reducing cross-contamination risks
- Optimization of process data management (thanks to Thema4 process controller)
- Reduction of overall energy consumption
- Capability of removal of large masses of sticky ointments/creams
- Lower overall CAPEX

Highest Performances

Thanks to Optimized Design

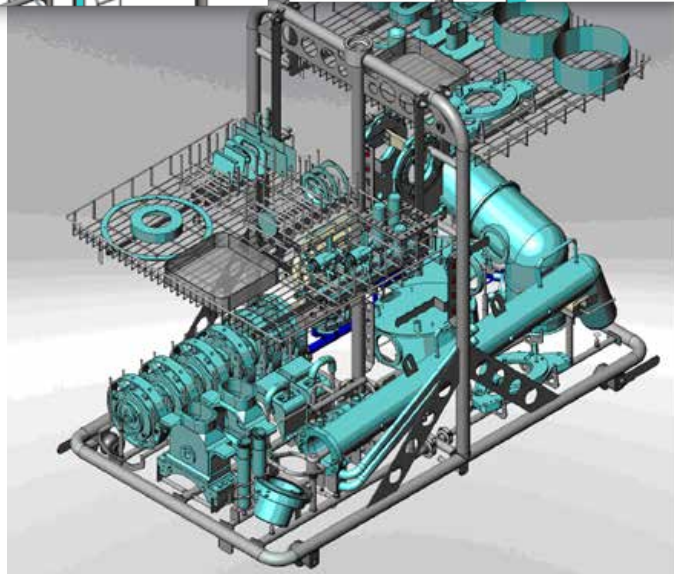


The integrated washing system is customized for every application and requirement. The core of FOWS is the washing rack on which several spray nozzles are installed for covering all load surfaces as well as the process chamber. The washing rack is connected to the water feeding system through a sanitary maintenance-free auto-coupling. Detergents and additives in general are injected in the water loop through a load cell-controlled system for exact metering; steam impacting the load through the same spray nozzles dramatically improves cleaning performances often sparing the need of additives. To further improve washing performances an innovative solution for rotating the load (based on a water turbine) is available for those machines where the load geometry allows to rotate the rack inside the process chamber. All static and rotating spray nozzles have been custom designed for achieving the highest sanitary features as well as washing performances.

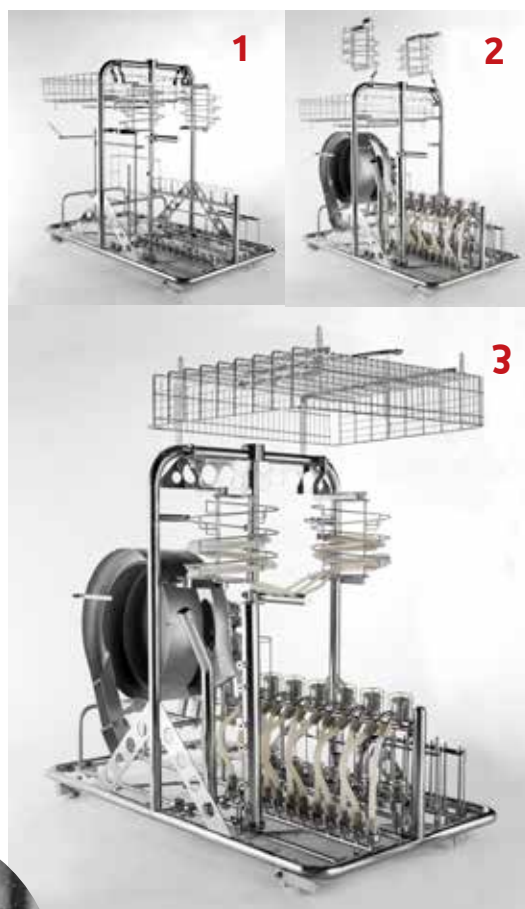
*optional



FWS & FOWS FULLY MODULAR & CUSTOM-MADE RACKS



No matter how challenging the task, there will never be a good solution for every application because every load has its unique peculiarities. Dedicated racks allow to standardize each load thus simplifying validation. Fully customized washing racks can be designed to meet any specific requirements.



Washing Technology

The piping allows, for the selection by dedicated valves, either to drive the water flow to spray bars, internal trolley or to all washing systems, to maximize the washing action even in the case of reduced availability of water flow rate.

The washing devices can include:

- nozzles
- spray arms
- rotating spray balls
- water blades
- orifices
- others



The loading racks are made in stainless steel 316L and designed to prevent any water stagnation by means of dedicated draining points.

TECHNICAL FEATURES



FWS ECO-STEAM WASHER

FWS doors

Made of glass with the perimeter reinforcement on 316L stainless steel. Equipped with silicone inflatable gasket, a patented design ensures perfect washing and drying of the surrounding area. Note the tubular shape of the gasket fixed in its slot without any locking device. The corners have a wide bending radius.



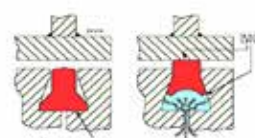
Alarms

LED lamp inside the chamber changes the color for signaling alarms during operations.

FOWS WASHER STERILIZER

The FOWS series present all the features of our **saturated-steam autoclaves**.

Loads are dry at the end of the cycle due to the use of vacuum.



Gasket designed for absolute tightness without maintenance.

FOWS doors

Made of 316L stainless steel. A unique design compensates thermal expansion. The door frame is designed considering the minimum number of welds to achieve QbD.

FWS & FOWS

Washing process optimization

Fedegari offers full customer support on process optimization. Depending on the nature and quantity of the residues to be cleaned, we can optimize:

- Washing temperature & time interval
- Additive concentration
- Number of rinses
- Phase sequence



Real/time conductivity monitoring available for FWS & FOWS.



Rotating Load



	FWS	FOWS
Pressure Vessel	-	✓
Material of the door	Stainless Steel + Glass	Stainless-steel
Piping	316L Sanitary	316L Sanitary
Drying	Blower, Heater and HEPA Filters	Vacuum Pump
Filter Integrity Check	DOP	WIT
SIP Filter	-	✓
Conductivity Meter	✓	✓
Process Controller	Thema4	Thema4
Integration with other Fedegari process equipments	Laminar Air Flow, Handling & Robotized Systems, FCIS Isolator, Hepa Cart, FCDV Decontamination Units/ Material Air-lock, others	Laminar Air Flow, Handling & Robotized Systems, FCIS Isolator, others



MAIN MODELS

GLP

FGW Glassware Washers

Model	Chamber Nominal Dimensions				Door Opening	Required utilities
	Width [mm]	Height [mm]	Depth [mm]	Capacity [l]		
FGW 350	680	740	710	357	1 or 2 Doors Vertical Sliding	Typical power required: 18 kW. Quality water , hot and cold depending on washing processes employed by the customer. PW or DIW to feed steam generator, if selected. Consumption - 6 ÷ 10 l/min Instrument compressed air Pressure from 5 to 6 bar g. General Drain and Vent
FGW 500	800	800	800	512		

GMP

FWS Eco-Steam Washers

Model	Door dimension [mm]	Chamber Depth [mm]	Chamber Volume [l]	Door Opening	Required utilities
XFWS	660x1000	1250	825	Vertical/Horizontal sliding or hinged	Electrical main power: requirements according to country of destination and customer requests. Typical power required: 10 kW 60 kW (with generator)
XFWS	660x1000	1500	990		
FWS1/9	800x800	1250	800	Vertical/Horizontal sliding or hinged	Instrument Compressed Air Requested pressure 5.5 bar General Drain and Vent
FWS1/1	800x800	1500	960		
XFWS/9	800x1000	1250	1000	Vertical/Horizontal sliding or hinged	Quality water, hot and cold depending on washing processes employed by the customer (requirements: chlorides < 30mg/l, hardness < 0,02 mmol/l, pH 5÷7,5) Consumption - 100 l/min or 30 l/min (recirculation mode)
XFWS/9	900x1000	1250	1125		
FWS2/9	900x1300	1250	1460	Vertical/Horizontal sliding or hinged	Purified water to feed steam generator if selected (requirements: chlorides < 30mg/l, hardness < 0,02 mmol/l, pH 5÷7,5) Clean steam
FWS2/1	900x1300	1500	1755		
XFWS/9	900x1500	1250	1685	Vertical/Horizontal sliding or hinged	
XFWS/1	900x1500	1500	2025		
FWS3/9	1000x1000	1250	1250	Vertical/Horizontal sliding or hinged	
FWS3/1	1000x1000	1500	1500		
XFWS	1000x1200	1250	1500	Vertical/Horizontal sliding or hinged	
XFWS	1000x1200	1500	1800		
FWS4/9	1200x1200	1250	1800	Vertical/Horizontal sliding or hinged	
FWS4/1	1200x1200	1500	2160		
XFWS	1200x1500	1250	2250	Vertical/Horizontal sliding or hinged	
XFWS	1200x1500	1500	2700		
XFWS	1300x1300	1300	2195		

GMP

FOWS Washer-Sterilizers

Model	Chamber Section	Chamber Nominal Dimensions				Door Opening	Required utilities
		Widht [mm]	Height [mm]	Depth [mm]	Capacity [l]		
FOWS3/A	Circular	800	800	1250	800	Horizontal sliding	According to equipment customization. Available upon request.
FOWS4/A	Circular	800	1000	1250	1000	Horizontal sliding	
FOWS5/A	Circular	900	1300	1500	1750	Horizontal sliding	
Operative pressure: 3.5 bar							

Fedegari is available to develop turn-key integrated solutions for every application requirement.

Besides the models here described we can engineer **customized projects** to meet every need of our partners.



CONTACT US

fedegari@fedegari.com

fedegari.com



KEY FACTORS IN THE CHOICE AND DEVELOPMENT OF A CLEANING STRATEGY

MAIN TOPICS

- ASPECTS DISTINGUISHING A CLEANING PROCESS
- SETTING UP A CLEANING PROCEDURE
- **CASE STUDY I: REMOVAL OF BACTERIAL ENDOTOXINS**
- **CASE STUDY II: APPLICATION OF A WASHER STERILIZER**
- **CASE STUDY III: SOIL REMOVAL FROM SMART PLATE**

This **e-book** discusses the main challenges on choosing and developing a cleaning strategy, highlighting different solutions field-tested.

**DISCOVER
THE POWER OF STEAM**



Scan the QR code to download our e-book





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CONTACTS

For any further information, do not hesitate to contact us at the following addresses:

Headquarter, Italy

Fedegari Autoclavi SpA
SS 235 km 827010
Albuzzano (PV)
Italy
T +39 0382 434111
F +39 0382 434150
fedegari@fedegari.com

USA

Fedegari Technologies, Inc.
1228 Bethlehem Pike
Sellersville, PA 18960
USA
T +1 215 453 0400
F +1 215 453 0406
info@fedegariusa.com

Italy

New Inox Srl
Via Europa, 3/5
27010 Filighera (PV)
Italy
T +39 0382 583132
F +39 0382 583528
newinox@fedegari.com

Singapore

Fedegari Asia Pte. Ltd.
16, Boon Lay Way #01-50 - Tradehub 21
609965 Singapore
Singapore
T +65 6 3164761
F +65 6 8967365
info@fedegariasia.com

Germany

Fedegari GmbH
Corneliusstr. 18
60325 Frankfurt Am Main
Germany
T + 49 (0) 69 907466200
F + 49 (0) 69 97145299
info@de.fedegari.com

Russia

Fedegari Rus OOO
Varshavskoe Chaussee 125D, corp. 2, of. 3
117587 Moscow
Russian Federation
T +7 (495) 258 3706
F +7 (495) 258 3706
i.ovchinnikov@eastconsult.eu

Switzerland

Fedegari (SUISSE) SA
Via alla Gerra, 11
6930 Bedano
Switzerland
T +41 91 9352090
F +41 91 9352099
info@ch.fedegari.com

China

Shanghai Fedegari Trading Co., Ltd
SML Center, Room 3005
XuJiaHui Road 610
Xuhui District, Shanghai 200025
China
T +86 021 60390739
info@cn.fedegari.com

India

Fedegari Tech Service Pvt. Ltd.
#506, Fifth Floor Shangrila Plaza
Road #2 Banjara Hills Hyderabad 500034
India
T +91/(040) – 38324500
info.india@fedegariasia.com