

Product Description

WD 290

Application

For use in healthcare facilities, e.g. CSSDs, for processing reusable instruments, containers, OR shoes and other solid objects as well as rigid endoscopes, eye instruments and neurosurgical instruments. The device is also suitable for reprocessing in the laboratory field.

Description

The WD 290 washer-disinfector was developed with the objective of ensuring efficient washing, disinfection and drying of instruments, containers and accessories while minimizing the consumption of natural resources.

The well-engineered, sophisticated stainless steel chamber and unique high-volume/low-pressure water circulation system allows reprocessing of up to 18 DIN trays. Disinfection can be run with $A_0 > 3000$, in accordance with EN ISO 15883-1, -2.

The WD 290 is available with either one or two automatic, vertically operated full-glass sliding doors which allows visual monitoring during the entire wash cycle.

The system also provides continuous process security, as all relevant performance parameters are monitored by the machine itself via the independent process data monitoring system.

The WD 290 washer-disinfector includes the following main features:

- Ergonomic product design from Belimed
- Patented process status display
- Large capacity wash chamber for up to 18 DIN trays
- Smallest footprint with only 900 mm width
- Resource saving system of up to 20% by dynamic filling
- Optional exhaust heat recovery unit
- Visual process inspection at any time by two full-glass doors
- Illuminated wash chamber
- Electrical heating with 400 V, 50 Hz; 3N/AC
- Optional steam heating of the wash chamber
- Fast filling, draining and heating
- 3 detergent pumps with flow meters and empty level control
- Disinfection monitoring function, $A_0 = 3000$
- Optional integrated printer on the loading or unloading side
- Optional automatic program recognition for up to 12 programs



Dimensions

Wash chamber:	H x W x D: 690 x 630 x 800 mm
Wash chamber capacity (net):	350 liters
Wash chamber capacity (gross):	430 liters

External dimensions

Standard model:	H x W x D: 1,840 x 900 x 940 mm
Model with exhaust air condenser: (optional)	H x W x D: 2,210 x 900 x 940 mm

Standard configuration and options

Supply

- Standard:
- Electric power, 380–415 V, 50/60 Hz; 3N/AC
 - Electric power, 200–220 V, 50/60 Hz; 3N/AC
 - Electric power, 208 V, 60 Hz; 3N/AC
 - Electric power, 480 V, 60 Hz; 3N/AC
- Optional:
- Steam connection

Door configuration

- 2 full-glass sliding doors, automatic, vertical
- 1 full-glass sliding door, automatic, vertical

Languages

The operator panel is able to have a max. of 3 different languages installed. German and English are set up in general and the 3rd language is always the local customer language.

Capacity/Cycle

- | | |
|---------------------------------------|-----|
| · Surgical instruments (DIN-trays): | 18 |
| · MIS instruments: | 150 |
| · Anesthesia material sets: | 7 |
| · Sterile goods container incl. lids: | 6 |
| · OR shoes: | 60 |
| · Baby bottles including caps: | 126 |

Standard configuration

- WD with drying system
- Automatic sliding full-glass doors, vertical
- Complies with EN ISO 15883-1, -2
- Microprocessor controller
- CP-TOP operating panel
- Patented process status display
- Illuminated wash chamber
- 3 water inlet connections (cold/hot/DI)
- Dynamic filling
- AISI 316L wash chamber
- CNS drain valve
- Exhaust air connection with flap
- H13 HEPA filter
- Validation connections for external recording of measurements
- Disinfection monitoring function, $A_0 = 3000$
- RS 232 and RS 485 interfaces
- 1 potential-free contact (K28)
- 3 dosing systems (dosing pump, flow meter, empty level control)
- Emergency stop button (both sides)
- Automatic program recognition (magnets)
- Socket paneling
- 9 predefined wash programs

Options (ex-factory installation)

- Steam-heated wash chamber
- RFID automatic rack and program recognition
- 2 additional potential-free contacts
- Independent process documentation IPD
- Conductivity control unit
- T-fitting for additional IPD pressure sensor

Options (on-site installation)

- Exhaust air vapor condenser
- DI water pre-heating (electrical)
- Exhaust heat recovery unit (electrical)
- Drain pump set
- Barcode reader
- Batch documentation with built-in printer (clean or unclean side)
- External printer
- Pre-shutoff valve activation function
- Ethernet Com-Server
- Steam connection set from below/from above
- Base pan with leakage sensor

Additional options (paneling)

- Set of side covers, complete for single and double door
- Set of side covers complete with extension (50 mm) incl. base or machines in case of steam supply from top and/or water supply from bottom without vapor air condenser/DI water pre-heating
- Intermediate and base panel 50 mm without vapor air condenser/DI water pre-heating
- Intermediate and base panel 50 mm with vapor air condenser/DI water pre-heating
- Intermediate and base panel 100 mm without vapor air condenser/DI water pre-heating
- Intermediate and base panel 100 mm with vapor air condenser/DI water pre-heating
- Paneling vapor air condenser/DI water pre-heating
- Paneling vapor air condenser/DI water pre-heating with extension (50 mm)

Racks and carts

- Rack Instruments 1 Level
- Rack Instruments 2 Level
- Rack Instruments 3 Level
- Rack Instruments 4 Level
- Rack Instruments 5 Level
- Rack Instruments 6 Level
- Rack Anesthesia
- Rack da Vinci
- Rack MIS
- Rack Containers
- Rack Baby bottle
- Rack Dental
- Rack LAB
- Transport trolley

Standards*

Area	Standard
Directive concerning medical devices	93/42/EEC
Safety	EN IEC 61010-1, EN IEC 61010-2-040
EMC	EN IEC 61326-1
Drinking water	EN 1717
Cleaning performance	EN ISO 15883-1, -2, certified by HygCen GmbH, Schwerin

*only the stated standards in the declaration of conformity are valid

Standard configuration: construction and functions

Wash chamber

The wash chamber is designed of stainless steel 1.4404 (AISI 316L). The wash chamber ceiling and sump are designed with a pitched angle to ensure complete drain age of water. This reduces the water evaporation requirement during the drying phase of the cycle and the risk of cross contamination is eliminated.

Wash chamber lighting

The wash chamber is illuminated by two integrated halogen lamps. This feature supports the operator in visual process inspection.

External material

Stainless steel, type 1.4301 (AISI 304) in combination with white foil and HiMacs® cover. Door design/fully safety glass panes – the doors are vertically operated, fully automatic sliding, slightly green-tinted full-glass doors. They are moved upwards by geared belts mounted on both sides. The door frame is pressed against the wash chamber frame at the top with a linear motor. The unit is equipped with two doors for a clear separation of the dirty and clean zone. The glass allows visual monitoring of the current running wash cycle. Safety switch actuator – in order to prevent closure of the door (e.g. if objects are in the way), the upper side of the door is fitted with a safety strip.

Wash chamber sealing

Circumferential silicone seal, which has an extended lifetime because of the intelligent door closing system. A drip tray on the inside prevents water from dripping down when the doors are open.

Wash arms

One wash arm is located at the top and one at the bottom of the wash chamber. Additional wash arms are located on each level of the racks. These are equipped with extra-large spray openings for maximum wetting, resulting in a high flow rate of water which indicates a high cleaning efficacy with low impingement.

Back flow preventer

To prevent any cross contamination of the hospital sanitary system in case of machine error, the unit is equipped with a back flow preventer according to tap water protection standards. The water inlet and the wash chamber are physically separated.

Automatic temperature control at water inlet

When precise temperature control of the input water is required, the control system will mix the level of hot and cold water to obtain the water temperature required for customer processes.

Gross and fine filter

The water is filtered by a gross filter (mesh size 2 mm). On the suction side of the wash pump, an additional fine filter (mesh size 1.5 mm) is located at the wash chamber exit to prevent any damage to the wash pump and blocking of the wash arm nozzles. Filters can be manually removed for cleaning from the loading side.

Heating system

The standard WD 290 is equipped with high power electric heating for the wash chamber (22 kW) and drying (10.5 kW). Steam heating is optionally available for the wash chamber. Drying is only available electrically.

Standard: · Electric heating

Optional: · Steam heating for the wash chamber (drying electric)

· Steam connection from above

· Steam connection from bottom

High performance dryer (electrical)

Two high performance electrical dryers (500 m³/h) are included with a heater output of 10.5 KW. The brushless motors operate without abrasion of coal, so no contamination of the air filters and heating elements can occur. The drying temperature is adjustable according to customer requirements (from room temperature up to 110 °C). Fresh air is lead through air filter class H13 (retaining rate 99.95%).

Exhaust air flap with condensate separator

The condensate separator prevents a backflow of the condensate into the wash chamber. The condensate flows directly from the exhaust air pipe to the drain. A false air flap reduces the heat loss through the washing/rinsing phases and opens automatically during drying stage.

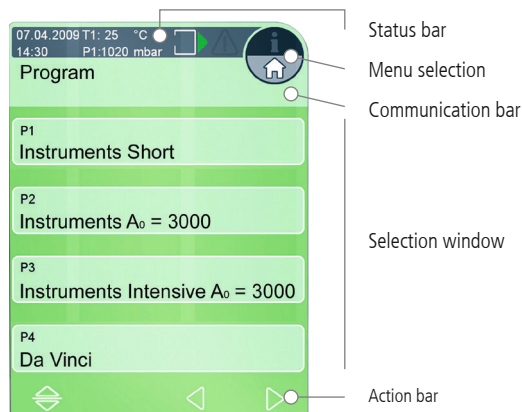
Microprocessor control

The Renaissance M16C processor with 256 K Byte EE Prom and 10K Byte RAM controls all system functions and monitors system operations. The control system has been specifically developed for washing applications. With the CP-Top keyboard, up to 12 freely definable programs can be selected. A program library with adaptable, ready to use programs assists in defining customized wash cycles.

A self-diagnosis system automatically runs test routines periodically for the purpose of early detection of potential errors. Respective input signals are monitored and possible deviations from the target default value range are indicated by visual and acoustic signals.

Operating panel – loading side

CP-Top screen containing the following:



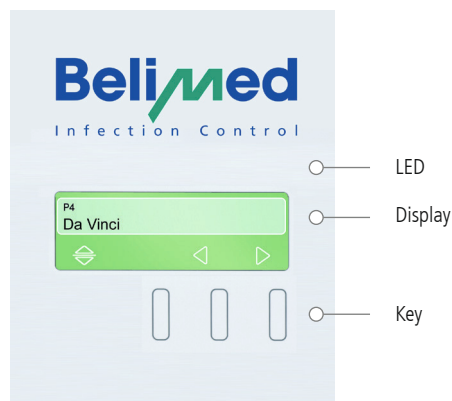
- **Status bar** General information, incl. time and date, error messages, transport unit status, etc.
- **Menu selection** Switching between the info menu and main menu. The respective active menu is displayed large below. Each time the button is pressed, you jump directly to the other menu.
- **Communication bar** The function selected at your current location is always displayed.
- **Selection window** The selection is highlighted. Start the action with the confirm button.
- **Action bar** Various actions are offered here: scroll, return, delete, etc.

The following functions are included:

- Programme selection and start
- Online display of the process
- Error messages and instruction texts in plain text with error history
- Maintenance messages
- Display and configuration of system master data
- Display of measured values
- PLC diagnostics
- User management – logging on and off
- Programme intervention
- Servicing functions

Operating panel – unloading side

Membrane keypad, two-line display monitor LCD (H x W = 20 x 120 mm) and integrated process status indicator.



- **LED** Warning and alarm messages
Wash cycle in progress
Door locked
- **Display** Date/time
Wash program
Current program step
Error messages
- **Key** Key for opening/closing door

Available programs

The WD 290 has 9 validated factory programs installed. These factory programs are set up to fulfil the common requirements from different standards as EN ISO 15883-1, -2. Additional programs can be compiled as desired by the customer.

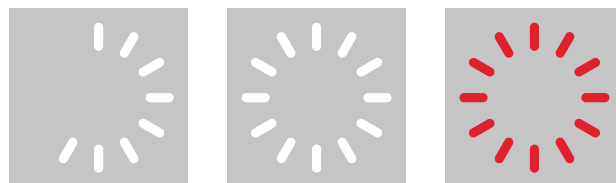
Patented process status display

The process status display, which has a clock-like design with LED technology, can be seen from a large distance. The status display indicates important process data such as remaining run time, readiness for loading or unloading, or error messages.

Remaining run time with more than 60 minutes will be displayed in form of a rapidly moving pointer. Remaining run time with less than 60 minutes will be displayed in form of a clock which builds up progressively.

The end of the process is visualized by the display of a complete clock which flashes and then goes out as soon as the door is opened.

A process error is indicated by a complete clock which flashes red.



Dynamic filling water inlet

Based on the load and rack, the specific amount of water needed will be filled into the system. The unique dynamic filling feature ensures the lowest water consumption by accepting no limitation in hygienic and process safety. By minimizing the amount of water used, the consumption of energy, detergents and water (hot/cold/DI) can be reduced by up to 20% per batch.

Thermal disinfection with A_0 value

A function added to the WD 290 permits abbreviated dwell time in thermal disinfection. The unit monitors and continuously integrates the effective heat volume according to the equation A_0 value above 65 °C already during the warm-up period. It terminates the process upon attaining the required A_0 value of 3000 or 600. It is left to the user to decide if they wish to terminate the process upon reaching the minimal required A_0 value of 3000 or to continue disinfecting to a higher value. In addition, the current A_0 value is continuously displayed and recorded.

Wash pump

A wash pump with stainless steel impeller recirculates 900 liters per minute of the washing solvent. The wash pump is designed to be fully drained after each cycle step to ensure that no residual water is in the pump housing. This reduces the risk of bacterial residues and prevents cross contamination.

Dosing pumps

Three (3) dosing pumps with flow meters are installed for dosing the cleaning agents. The flow meters ensure control of flow. The monitoring method is either impulse controlled or time controlled and can be selected on site.

Empty level control for detergents

The WD 290 can be connected to a centralized chemical dosing system or connected directly to a detergent canister next to the machine. Each canister should be equipped with one empty level control which indicates a low level alarm on the operator panel screen. The empty level detectors are available for 10 liter or 25–30 liter cans.

Dosing of detergents

Based on the filled water amount in the wash chamber, the controller calculates the required amount of detergent following the concentration requirements of the used detergent. The dosing system with the flow meter and the peristaltic pumps ensures a precise dosing.

Foam control

If excessive foam formation is detected via a signal message during pre-rinsing, the pre-rinsing step is automatically repeated without a preceding display message.

Interfaces

Both interfaces – RS232 and RS485 – are available. An external printer or a barcode reader can be connected to the RS232 interface. The RS485 interface is used, for example, for the BELIMED ICS 8535 batch documentation system.

Servicing access

The servicing access is on the front side below the wash chamber. In addition, a drawer provides easy access to the controller and electronic components. For the single door version, a distance of at least 660 mm must be kept between the loading side and the wall to the right of the machine. On the left side, the machine can be installed directly adjacent to the wall.

Main power switch

The machine provides easy access for to the main power switch for shutting down the complete machine. The access is located on the loading side.

Emergency stop button

The system can be immediately shut down and switched to a safe state by activating the EMERGENCY STOP button.

Batch documentation

The built-in printer documents and records each cycle performance. At the end of a completed cycle, the cycle performance record is printed. The printed cycle information includes transition points, pressure and temperature indication, cycle start time, date, both washer and cycle numbers, and any process faults that occurred during the cycle.

Rack docking system

One central cylindrical sleeve on the machine bottom is pressed against the wash rack by water pressure. This sleeve establishes a form-fitting connection and enables best possible water delivery to the rack. The water and pressure loss throughout the process can be reduced to a minimum. The sleeve is returned automatically to the original position when the wash pump is deactivated.

Automatic maintenance indication

The control system offers the availability to indicate when the next scheduled service call should be completed. This allows maximum up-time of the washer and reduces the risk of unexpected down-time.

Options: design and functions

Exhaust air vapor condenser

The exhaust will be cooled down and dehumidified in the highly efficient vapor condenser. By being cooled with tap water or with cooling water from a closed cooling system, the air loses moisture and can thus be fed into the building exhaust air system.

DI water pre-heating (electrical)

Enables pre-heating of the DI water for thermal disinfection to 93 °C parallel to the wash process. This feature allows a cycle reduction up to 14 minutes compared to standard execution.

Exhaust heat recovery unit (electrical)

During the drying stage, the heat of the exhaust air is used to preheat the DI water via a heat exchanger. Parallel and at the same time, the DI water is used for cooling/condensing the exhaust. By being cooled, the air loses moisture and can thus be fed into the exhaust air system. The pre-heated DI water (ΔT 27 °C) is fed into the DI water preheating tank. This heat recovery saves energy up to 1.4 kWh and up to 14 minutes cycle time and 35 liters of tap water.

Independent process data monitoring (IPD)

All relevant parameters are continuously monitored by independent sensors (optional). Discrepancies between the actual and target values lead to an error message and/or immediate discontinuation of the program.

T-fitting for additional IPD pressure sensor

If validation requires a second pressure probe close to the wash arms, a T-fitting can be used to implement a pressure sensor at the end of the standpipe connected to the wash pump.

ICS 8535

The BELIMED batch documentation system, which can be additionally ordered, provides an IT-supported solution to ensure traceability of medical devices circulating between the operating theatre and the CSSD. All relevant data are stored and available on the ICS 8535 of each batch.

2 additional potential-free contacts

One potential-free contact is available as standard. Two more contacts can be optionally installed.

Drain pump set

If a physical drain is not applicable because of limitations in the building drain system, an additional drain pump set can be installed to drain the WD 290 completely.

Floor pan with sensor

To protect the environment from being flooded after a major accident or major breakdown in the water system, a floor pan with a water level detector sensor can be installed. The level sensor automatically closes all inlet valves as soon as it has been activated.

Barcode reader

A bar code reader can be ordered as an option to use barcodes for user recognition and documentation. All commands on both sides of the WD 290 can be done with the bar code reader, according to customer needs.

Cycle documentation

The built-in printer documents and records each cycle performance. At the end of a completed cycle, the cycle performance record is printed. The printed cycle information includes transition points, pressure and temperature indication, cycle start time, date, both washer and cycle numbers, and any process faults that occurred during the cycle. The built-in printer can be installed either on the clean or on the unclean side.

Optionally, the WD 290 can also be connected to SmartHub. The on-site software ensures all relevant data are captured in real time to be further processed by any Instrument Tracking System or in form of an easy-to-read PDF file.

Pre-shutoff valve activation function

Belimed recommends having a shutoff valve for the water piping on the building side (for cold water, hot water and DI water), controlled by the building control system. If such a safety installation is not possible, the optional pre-shutoff valve activation can be installed. This option does not contain the valve, but gives a signal to activate such a valve.

Ethernet Com-Server

This option allows the controller and the IPD system to be connected to any Ethernet.

External printer

The WD 290 is able to send all batch data via ICS 8535 to any external printer that is connected to the customer network.

Steam connection set from below/from above

To have full flexibility on the building side, the steam can be connected either from the bottom or from the top. Both connection sets are available as an option. Belimed recommends using the panel spacer if multiple WD 290 are lined up.

Choosing dosing pumps (Pharmed®/Viton®)

The WD 290 contains 3 dosing systems (incl. dosing pump, flow meter and empty level detergent detector). The peristaltic pumps are equipped with silicon tubes. The tube material can be ordered as Pharmed® or Viton®.

RFID automatic rack and program recognition

The WD 290 is equipped with rack recognition. When entering the rack, the machine selects the allocated program to avoid any wrong manipulation by the operator. The RFID antenna is located on the loading side and reads the RFID tag which is located on the rack.

Conductivity control unit

Some applications require an additional control of the drain after the neutralization step. By using a conductance probe in the drain, the water quality can be measured. If cleaning agent residues are detectable, the neutralization step will be automatically redone.

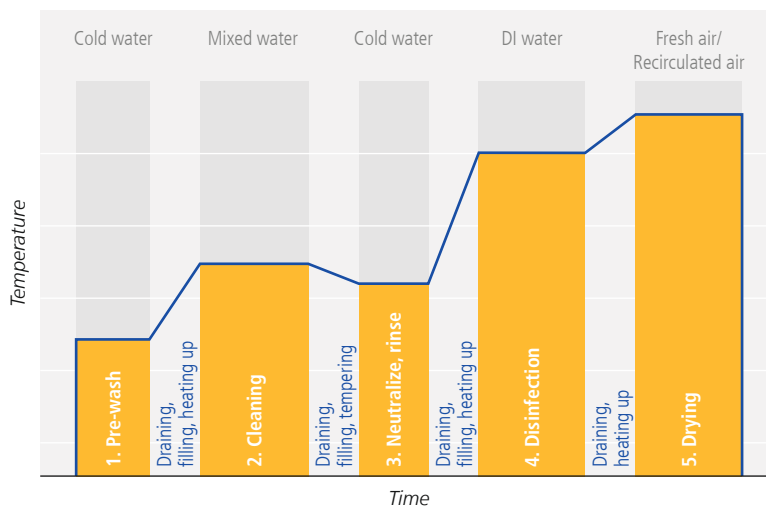
Ergonomics

The WD 290 has an ergonomic loading height for perfect loading and unloading of the items to be washed as well as a user-friendly operating system.

Easy installation

The WD 290 is easy to install. Apart from connections for water (hot/cold), DI water, waste water, exhaust air and electrical (steam) power, no further connections are required.

Sample process cleaning and disinfection WD



Wash cycle procedure – description

Pre-rinse

Cold water is used for the pre-rinsing process. Water is filled and the pump starts running until a pre-defined minimum level is reached. At the end of the phase, the water is discharged into the drain.

Washing

A mixture of warm and cold water is filled, depending on the type of process selected. The cleaning agent is dosed precisely according to the manufacturer's specifications. The heating-up process starts in accordance with the programmed temperature profile. At the end of the phase, the water is discharged into the drain.

Neutralizing

After alkaline cleaning, the much-feared caustic carryover is prevented by neutralizing with a weakly acidic neutralizer.

Rinsing

In the rinsing step, warm water is used to remove cleaning agent residues. Two phases can be run here, depending on the cleaning agent. At the end of the phase, the water is discharged into the drain.

Thermal disinfection

DI water is filled, circulated and at the same time heated up to 93 °C. The disinfection effect is achieved by means of a programmed holding time at 93 °C. For disinfection according to $A_0 > 3000$, the energy input is summed up from 65 °C upwards. At the end of the phase, the water is emptied completely into the drain.

Drying

Fresh air is fed in via a system equipped with HEPA filters. The air fan is placed before the filter in order to ensure that no particles from the fan or the heating system can enter the chamber.

Self-disinfection of the machine

If the device is out of operation for a defined period of time, a self-disinfection process (according to A_0 values) is automatically started or suggested. This is to ensure that the whole system has been disinfected before being taken into operation again, and before instruments are once more reconditioned.

Factory programs

- P1 Mild alkaline washing of Instruments Short
- P2 Mild alkaline washing of Instruments
- P3 Mild alkaline washing of Instruments Intensive
- P4 Mild alkaline washing of Anesthesia
- P5 Mild alkaline washing of Operation Shoes
- P6 Mild alkaline washing of Baby Bottles/Glassware
- P7 Neutral enzymatic washing of Containers
- P8 Neutral enzymatic washing of Instruments
- P9 Neutral enzymatic washing of Instruments Intensive

Process validation

The aim of process validation is to achieve a high level of safety in the reconditioning of medical devices in order to afford the operators and patients the greatest possible protection. We provided on-site installation qualification and process validation for each of our products.

Cleaning agents and disinfectants

The Belimed Protect™ range of chemistries have been developed and validated with Belimed Washer-Disinfectors to meet the cleaning efficacy requirements of medical devices and associated accessories according to consistent and repeatable standards outlined in EN ISO 15883-1, -2. Belimed offers a fully integrated solution to address your infection prevention requirements, ensure compliance and reduce costs caused by hospital-acquired infections.

Contact your local Belimed representative to obtain more information on the full Belimed Protect™ range of products and services.

Preventive maintenance

Belimed recommends preventive maintenance on a regular basis to ensure the proper functioning of the device. Belimed has a nationwide network of trained service technicians who perform these maintenance tasks on site.

Disclaimer

Do not use this product description for installation of the machine. The product description can be updated without notice and is only updated periodically.



Belimed d.o.o.
Taborska cesta 38 E 1290 Grosuplje Slovenia



Belimed AG
Grienbachstr. 11 6300 Zug Switzerland +41 41 449 78 09
www.belimed.com

CE 0044

Belimed
Infection Control