RAYPA

Sterilization

# BENCHTOP AUTOCLAVES WITH DRYING

## AHS-DRY SERIES CLASSIC LINE

ECONOMIC, COMPACT, COST-EFFECTIVE, ROBUST PERFORMANCE AND LIMITED LABORATORY RESOURCES CONSUMPTION

# Front-loading benchtop autoclaves with drying

The **AHS-DRY** Series benchtop autoclaves with front-loading access cover most laboratory sterilization needs in many industries, educational institutions and research facilities with the aim of increasing the productivity of the laboratory. A great chamber capacity, the final drying feature and the independent water tank together with the optimization of resources such as water, power and operating time results in an affordable and very cost-effective solution to manage laboratory workload.

## INTENDED USE

+ **STERILIZATION OF LABORATORY WASTE BAGS, PLASTICS, CULTURE MEDIA, GLASSWARE, LIQUIDS, ITEMS OF COMPLEX GEOMETRIES AND SMALL POROUS OR HOLLOW OBJECTS**

AHS-50-DRY

AH-21-L

## MAIN FEATURES

### COST-EFFECTIVE SOLUTION

**AHS-DRY** Series autoclaves are robust autoclaves with excellent performance for liquids and solids sterilization procedures. The final vacuum drying feature by a heating jacket and a vacuum pump at the end of the sterilization cycle eliminates the need of an external equipment to dry the load, significantly reducing the duration of each sterilization procedure rotation and saving operator time.

### MULTIPLE TYPES OF STERILIZATION CYCLES

Several options available to perform solids or liquids sterilization. Programmable final vacuum drying for the sterilization of solids, initial prevacuum for the sterilization of items of complex geometries and programmable temperature holding at the end of the cycle for the sterilization of culture media. Optional flexible temperature probe for load sensed sterilization of liquids.

### EASY INSTALLATION AND MAINTENANCE

Every **AHS-DRY** Series autoclave is a plug and play equipment that does not need dedicated installation connections. They simply need a power source and can work even without a connection to the drainage. They include a manually fed independent water tank that automatically feeds the sterilization chamber with an optional upgrade to fully automatic water feed directly from water network.

### SAFETY FIRST

**AHS-DRY** Series autoclaves are equipped with several features to ensure the safety of the operators. These include an overpressure safety valve, a thermally insulated door, an overtemperature safety thermostat, a water level detector, an open door detection system and an independent safety pneumatic system that locks the main door while positive pressure exists inside the sterilization chamber.

## ADVANTAGES

- Final vacuum drying feature by a heating jacket and vacuum pump to completely dry solid loads.
- Sterilization chamber and door made of high quality stainless steel grade AISI-316L extremely resistant to corrosion.
- Equipment built following all applicable European Union quality, regulatory and safety standards.
- Heating by powerful electric elements made of Incoloy® 825 assembled inside the sterilization chamber and shielded by a protective grid.
- Control by a PID microprocessor with 4 predefined and 6 editable programs, adjustable by time, temperature, drying time and type of sterilization cycle (solids or liquids, with optional Agar mode and/or core probe control).
- Adjustable temperature holding at the end of the sterilization cycle between 40-80°C (Agar mode).
- Suitable to sterilize wrapped and unwrapped loads, small porous and hollow objects and items of complex geometries with cavities thanks to the standard initial prevacuum phase*.
- Automatic water feed to the sterilization chamber from the independent water tank, with water level sensors included in both locations. Optional upgrade to fully automatic water feed directly from water network.
- Programmable auto-start for up to 24 h.
- Optional software for sterilization data management.
- Optional integrated or external printer.
- Plug and play equipment, no plumbing required.

## STERILIZATION APPLICATIONS

**AHS-DRY** Series autoclaves are intended for the sterilization of a wide range of liquids and solids such as culture media, glassware, plastics, metal utensils, laboratory waste bags and other laboratory items.

Furthermore, thanks to the standard initial prevacuum pulse and the fractioned postvacuum with drying, **AHS-DRY** Series autoclaves are also suitable to sterilize wrapped and unwrapped solids, small porous and hollow objects*.

*__AHS-DRY__ Series autoclaves may not be suitable for these applications if the chamber is heavily loaded. In these circumstances, **AHS-B** Series autoclaves should always be used. In case of doubt, please contact us and our team will offer expert guidance.

# Front-loading benchtop autoclaves with drying

## WORKING PRINCIPLE

**AHS-DRY** Series autoclaves provide a solution for the multiple sterilization needs of general laboratories including glassware, plastics, metal utensils, laboratory waste bags, wrapped and unwrapped solids, small porous and hollow objects, liquids, culture media and other laboratory items.

The load has to be placed into the vessel's trays or basket and, after manually filling the independent water tank with purified water, the equipment starts to create the initial prevacuum, automatically feeds water to the sterilization chamber, heats up and purges until the set combination of sterilization time and sterilization temperature is reached.

### DIGITAL MICROPROCESSOR

Digital microprocessor with 6 push-buttons for an easy programming and parameters selection.


### AHS-DRY SERIES PROGRAMS

**AHS-DRY** Series autoclaves have 10 programs, from P0 to P9, and the first four are predefined and protected.

#### PREDEFINED PROGRAMS

| Program Nº | Sterilization temperature °C | Sterilization time min | Drying time min | Program mode Solids, Liquids or Agar | Core probe regulation |
|---|---|---|---|---|---|
| **P0** | 115 | 60 | 12 | Solids | - |
| **P1** | 121 | 30 | 25 | Solids | - |
| **P2** | 133 | 20 | 30 | Solids | - |
| **P3** | 121 | 20 | - | Liquids | - |

The rest of the programs are editable with the following parameters settings:

- Sterilization temperature.
- Sterilization time.
- Final drying time.
- Sterilization mode (Solids or Liquids).
- Sterilization with temperature holding at the end of the cycle (Agar mode).
- Sterilization controlled by main chamber temperature probe or both main chamber temperature probe plus core temperature probe.

## STANDARD AHS-DRY SERIES STERILIZATION CYCLE

### PREVACUUM PHASE

- In this initial step, the equipment's vacuum pump mechanically removes air from the chamber and load through a single vacuum pulse of -0,75 Bargs. This allows the steam to penetrate load objects of difficult geometries that couldn't otherwise be reached with simple gravity displacement.
- Afterwards, the independent water tank starts to feed water to the sterilization chamber and the heating jacket is turned on, preheating the load.

### HEATING PHASE

- After completing the prevacuum phase and once the sterilization chamber bottom is filled with water, the powerful heating elements assembled at the bottom of the sterilization chamber heat up dramatically, transferring energy to water to produce saturated steam throughout the chamber.

### STERILIZATION PHASE

- Upon reaching the set sterilization temperature inside the chamber the sterilization phase begins, accurately sustaining the temperature throughout the duration of this phase.
- This crucial step is controlled by a PT-100 Class A temperature probe located within the chamber. As an option for liquid sterilization processes, this phase can be regulated by a flexible PT-100 Class A temperature probe located inside a sample.

### VACUUM DRYING PHASE

- After sterilization phase finishes, only for solid programs, vacuum drying starts, where multiple vacuum pulses occur while the heating jacket is turned on, completely drying the load and automatically feeding back the water to the independent water tank.

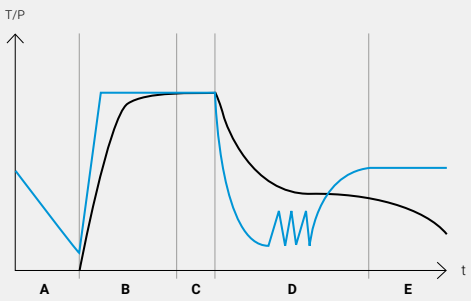
### COOLING PHASE

- After the vacuum drying step is completed natural cooling begins and an acoustic beep will sound when a safety temperature is reached and the door can be opened.
- In liquid programs with Agar mode activated, the equipment will hold the preprogrammed temperature indefinitely, selectable between 40 and 80ºC.

**Sterilization cycle graph for a solid load**

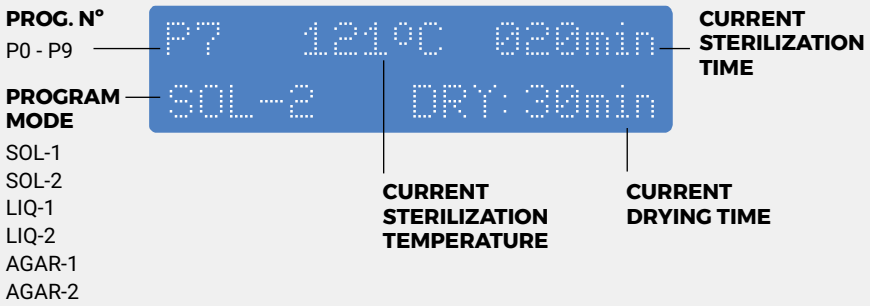
**A** Prevacuum phase
**B** Heating phase
**C** Sterilization phase
**D** Vacuum drying phase
**E** Cooling phase

— Temperature
— Pressure



## FUNCTIONS DISPLAYED BY THE ALPHANUMERIC LCD SCREEN

The alphanumeric screen apart from showing the standard sterilization parameters also shows current sterilization phase and several visual alerts, including warning or failure messages. The available languages include English, Spanish, French and Catalan. For other languages please contact us.



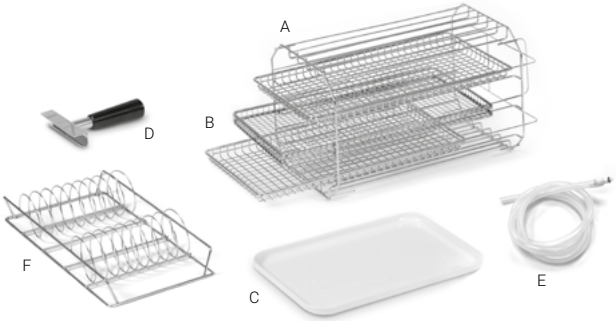

# DIFFERENT SIZES BUT SAME FEATURES

## AH-21-L

## AHS-50-DRY & AHS-75-DRY

### COMPONENTS SUPPLIED WITH THE EQUIPMENT

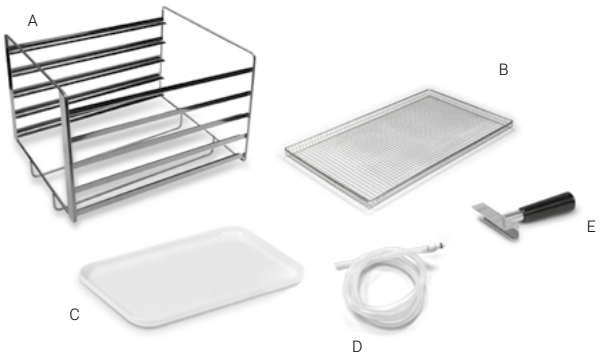
A. Stainless steel tray support for 4 trays*.
B. 3 stainless steel wire trays.
C. Auxiliary plastic tray for collecting condensed water after opening the door in cycles without final drying.
D. Holding clamp to move the trays.
E. Silicone tube of 1m with fast connection to drain the independent water tank.
F. Sainless steel bag support
Stainless steel protecting grid for the heating elements.




*Special tray support compatible with up to 5 trays available under request.

### COMPONENTS SUPPLIED WITH THE EQUIPMENT

A. Stainless steel tray support for 5 trays.
B. 2 stainless steel wire trays.
C. Auxiliary plastic tray for collecting condensed water after opening the door in cycles without final drying.
D. Silicone tube of 1m with fast connection to drain the independent water tank.
E. Holding clamp to move the trays
Stainless steel protecting grid for the heating elements.



# Front-loading benchtop autoclaves with drying

## Accessories

### STAINLESS STEEL WIRE TRAYS

| Reference | | BAH-21 | BAH-50 B | BAH-75 B |
|---|---|---|---|---|
| **Dimensions** | **Exterior** L x D mm | 190 x 350 | 315 x 330 | 315 x 530 |
| **For autoclaves with the following chamber volumes** | 22 L | 4* | - | - |
| | 55 L | - | 5 | - |
| | 79 L | - | - | 5 |

*Special tray support compatible with up to 5 trays available under request.

### STAINLESS STEEL WIRE HORIZONTAL BASKET

| Reference | | RB-AH-21 | RB-AHS-50 | RB-AHS-75 |
|---|---|---|---|---|
| **Dimensions** | **Exterior** L x D x H mm | 170 x 340 x 180 | 324 x 360 x 235 | 324 x 560 x 235 |
| | **Interior** L x D x H mm | 160 x 330 x 170 | 314 x 350 x 225 | 314 x 550 x 225 |
| **For autoclaves with the following chamber volumes** | 22 L | 1 | - | - |
| | 55 L | - | 1 | - |
| | 79 L | - | - | 1 |

### STAINLESS STEEL BAG SUPPORT*

| Reference | | BAP-21 | BAP-75 |
|---|---|---|---|
| **Dimensions** | **Exterior** L x D x H mm | 400 x 180 x 80 | 300 X 180 x 95 |
| **Slots / support** | | 20 | 20 |
| **For autoclaves with the following chamber volumes** | 22 L | 1 | - |
| | 55 L | - | 4 |
| | 79 L | - | 6 |

*This accessory can be customized in size according to each client needs. For more information please contact us.

### STAINLESS STEEL CONTAINERS WITH FILTER ON THE LID

| Reference | | FC-215 | FC-331 | FC-338 |
|---|---|---|---|---|
| **Dimensions** | **Exterior** L x D x H mm | 285 x 185 x 65 | 300 x 300 x 110 | 300 x 300 x 85 |
| | **Interior** L x D x H mm | 275 x 175 x 55 | 290 x 290 x 100 | 290 x 290 x 75 |
| **For autoclaves with the following chamber volumes** | 22 L | 2 | - | - |
| | 55 L | 6 | 1 | 2 |
| | 79 L | 9 | 2 | 4 |

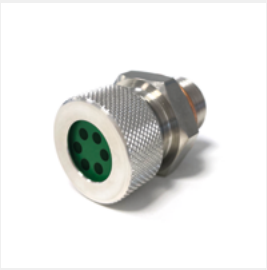
## Accessories

### FLEXIBLE CORE TEMPERATURE PROBE PT-100 CLASS A

- After installing this accessory, the temperature regulation of the sterilization cycle can either be controlled by the main chamber temperature sensor or both the main chamber temperature sensor and the temperature sensor of the flexible core temperature probe.
- The temperature control by the flexible core temperature probe is especially advantageous for processes involving the sterilization of large volumes of liquids, where the sterilization process is regulated by both the temperature achieved in the center of the liquid sample as well as the temperature achieved in the sterilization chamber. Furthermore, should the autoclave be opened at chamber temperatures higher than 80ºC there is a risk of liquids boiling over which can be avoided if the temperature of the sample is controlled throughout the sterilization procedure.
- Must be installed in our facilities.

Reference: **PT-2-AH**

### CABLEGLAND



- Installation of a Ø2mm or Ø4mm cable gland to provide access to as many as eight external temperature probes for calibration and validation procedures.
- Must be installed at our factory.

Reference: **PRENSACLAV**

### INTEGRATED THERMAL PRINTER

- Prints program number, cycle number, temperature, date and hour of the run and error messages.
- Selectable printing cadence between 10 and 240 seconds.
- Must be installed in our facilities.

Reference: **IT**

Consumable:
Paper: **PAPER-IT**

### TABLE TOP DOT MATRIX PRINTER

- Prints program number, cycle number, temperature, date and hour of the run and error messages.
- Used with RS-232 connection.
- Selectable printing cadence between 10 and 240 seconds.

Reference: **ITS**

Consumables:
Paper: **PAPER-ITS**, Ribbon: **70945**

### SW7000 SOFTWARE

- Communication software between the equipment and the PC that allows the real-time and posterior visualization and registry of each cycle. Cycles can also be exported to Excel or printed.
- Connection to PC via RS-232.
- Supplied with a RS-232 cable, an USB stick that includes the software and installation drivers and a RS-232 to USB adapter.

Reference: **SW7000**

# Front-loading benchtop autoclaves with drying

## Accessories

### AUTOCLAVE TABLE

- Stainless steel table with four casters (with brakes on two).
- Designed to accommodate any model of benchtop autoclave, including larger models.
- Dimensions (LxDxH): 800 x 900 x 800mm.

Reference: **TABLE-AHS**

### TRANSPORT TROLLEY

- Auxiliary trolley to assist the loading and unloading of the autoclave.
- Built in chromed iron and plastic.
- The surface of each shelf is textured to prevent the load from shifting.
- Rubber coated wheels to reduce noise.
- Dimensions (LxDxH): 730 x 490 x 700 mm.

Reference: **TR-TR**

### STERILIZATION CONTROL TAPE

- Class 1 indicator for steam sterilization. The change of color indicates that the materials have been processed, without being a guarantee of proper sterilization, additional methods are needed such as biological indicators (EN ISO 11138).
- Tape roll of 50 m x 19 mm.

Reference: **TEST-CT**

**20 min. 121°C**
Color change.

### WATER DISTILLER

- Forced air water distiller with stainless steel interior, a capacity of 4L and a distillation volume output of 1,5L/h.

Reference: **DEM-4**

### AUTOMATIC WATER FILLING KIT

- Water pump to automate the feed of the water tank with purified water in benchtop autoclaves.
- Compatible with installations that either have a purified water network, a purified water tank or facilities that have an unpurified water network, in the latter case, the kit should be supplied with two other accessories: water purifier (ECOPUR-500) and purified water tank (TANK-KLL).
- Must be installed in our facilities.

References:
**KLL-21**
**KLL-AHS**

### ECO-EFFICIENT WATER PURIFIER

- Direct flow eco-efficient water purifier without water accumulation capable of filtering 1,3L/min with LED display.
- The installation of this accessory requires the joint installation of the external tank (TANK-KLL) and the automatic water filling system (KLL-21 or KLL-AHS) corresponding to each model.

Reference: **ECOPUR-500**

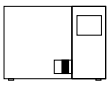
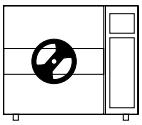
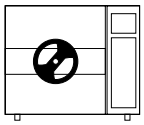
| **Exterior dimensions** L x D x H mm | **Purity (TDS)** ppm | **Electrical conductivity** µS | **Hardness** mmol/l |
|---|---|---|---|
| 220 x 425 x 415 | 0,0005 | >1 | 0,0125 |

## TECHNICAL SUMMARY OF AHS-DRY SERIES AUTOCLAVES

| Available models | | AH-21-L | AHS-50-DRY<br>AHS-75-DRY |
|---|---|---|---|
| **General classification** | Recommended setting | General laboratory | |
| | Equipment placement | Benchtop | |
| | Load direction | Front-loading | |
| | Chamber profile | Round | |
| **Recommended type of load** | Culture media and liquids | ++ | |
| | Laboratory waste bags | ++ | |
| | Porous solids and wrapped loads | + | |
| | Glassware | ++ | |
| **Sterilization technology features** | Method to generate steam | Heating elements | |
| | Type of purge | Vacuum | |
| | Vacuum drying by heating jacket and vacuum pump | ✔ | |
| **Transfer of data** | RS-232 | ✔ | |
| **Batch printers** | Integrated printer | O | |
| | External printer | O | |
| **Sterilization chamber and door specifications** | Sterilization chamber volume | 22 L | 55 - 79 L |
| | External building materials | Metallic & AISI-304 | |
| | Sterilization chamber material | AISI-316L | |
| | Heating elements material | Incoloy® 825 | |
| | Gasket material | Silicone rubber | |
| | Min.- max. sterilization temperature | 100 - 134°C | |
| | Maximum pressure (above atmospheric pressure) | 2,1 Barg | |
| | Mechanism to open the door | Handle | Wheel |
| | Direction in which the door opens | Frontal | |
| | Automatic locking with pressure | ✔ | |
| | Thermally insulated door | ✔ | |
| **User interface and microprocessor** | Screen display | Digital LCD | |
| | Screen size | 2 lines x 16 digits | |
| | Total number of available programs | 10 | |
| | Automatic microprocessor control | ✔ | |
| | Timer start | ✔ | |
| **Special cycles and process optimization** | Agar mode (temperature holding after cycle ends 40-80ºC) | ✔ | |
| | Final postvacuum drying (to completely dry solid loads) | ✔ | |
| | Temperature regulation by core probe | O | |
| **Adjustable cycle parameters** | Agar mode | 40 - 80°C | |
| | Temperature of sterilization phase | 100 - 134°C | |
| | Duration of sterilization phase | 1 - 250 min | |
| | Duration of drying phase | 3 - 99 min | |
| | Temperature regulation by core probe | On/Off | |
| | Sterilization mode (solids or liquids) | ✔ | |
| **Other specifications** | Air intake with bacteriological filter | ✔ | |
| | Independent water tank capacity | 6 L | 10 L |
| | Flexible core temperature probe | O | |
| | Rubber feet | ✔ | |
| | Pressure gauge | ✔ | |
| | Electric customization (115-230M V/230-400T V) | O | |
| **Services** | Third-party qualification (IQ/OQ/PQ) | O | |

+: Recommended ✔: Included O: Optional

## TECHNICAL DATA

## Specifications

| References | AH-21-L | AHS-50-DRY | AHS-75-DRY |
|---|---|---|---|
| Total/usable volume of the chamber L | 22/21 | 55/50 | 79/75 |
| Usable dimensions of the chamber Ø max. x D mm | 210 x 430 | 360 x 400 | 360 x 600 |
| Volume of the built-in water tank L | 6 | 10 | 10 |
| External dimensions L x D x H mm | 560 x 660 x 425 | 805 x 805 x 650 | 805 x 1005 x 650 |
| Maximum number of trays | 4 or 5 | 5 | 5 |
| Tray size L x D mm | 190 x 350 | 315 x 330 | 315 x 530 |
| Net weight Kg | 49 | 109 | 126 |
| Power W | 2000 | 2800 | 3200 |
| Standard voltage* V | 230 | 230 | 230 |
| Frequency Hz | 50/60 | 50/60 | 50/60 |

*Other voltages and electrical configurations available on request.

## Safety features

- Safety valve.
- Safety thermostats with manual rearm for the heating jacket and the heating elements.
- Pneumatic door blocking system while positive pressure exists inside the sterilization chamber.
- Open door sensor.
- Thermally insulated door.
- Water level detector in the sterilization chamber.
- Water level detector (min./max.) in the independent water tank with overflow drainage.
- Bacteriological filter for inlet air.
- Heating elements cover.
- Several visual and acoustic safety and warning alarms.

## Regulations

All our AHS-DRY Series autoclaves are designed to comply with the strictest international directives and standards, including the following regulations:

- **EN-61010-1** Safety requirements for electrical equipment for measurement, control and laboratory use. Part 1: General requirements.
- **EN-61010-2-040** Part 2-040: Requirements for laboratory autoclaves.
- **EN-61326** Electrical equipment for measurement, control and laboratory use. EMC requirements.
- **AD 2000 Merkblatt** Pressure vessels.
- **2014/35/UE** Low voltage.
- **2014/30/UE** Electromagnetic compatibility.
- **2014/68/UE** Pressure equipment.

## General features

| | |
|---|---|
| Adjustable sterilization temperature | 100 - 134ºC |
| Adjustable sterilization time | 1 - 250 min |
| Adjustable drying time | 3 - 99 min |
| Max. pressure | 2,1 Barg |
| Sterilization control system | Fully automatic microprocessor control by either chamber temperature probe or flexible core temperature probe |
| Air purge system | Mechanical displacement by vacuum pump |
| Vacuum drying system | Vacuum pump plus heating jacket |
| Single prevacuum pulse system | Vacuum pump |
| Sterilization chamber material | AISI-316L stainless steel |
| Heating elements material | Incoloy® 825 |
| Gasket material | Silicone rubber |
| Connection to PC | RS-232 |
| Connection to printer | RS-232 or integrated |
| Number of programs | 10 (4 preset and 6 user free) |
| Programmable auto-start | Up to 24 h |
| Screen type | LCD display |
| Opening door mode | Front-loading swiveling door |
| Monitoring of sterilization parameters | Self-control of obtained values (T° & t) vs programmed values. Cycle is automatically interrupted if obtained values differ from programmed values |
| Pressure display | Pressure gauge on control panel |
| Water management | Independent manually fed water tank that automatically feeds the sterilization chamber. Water returns automatically to the independent water tank after cycle is completed. Optional upgrade to fully automatic water feed directly from water network |
| Drainage system | Drainage connections for both drainage and overflow of the independent water tank and a screw to manually clean the drainage filter and drain the sterilization chamber |
| Feet | Feet with resistant rubber |

+ info


Find out more about our AHS-DRY Series on our **Youtube** Channel.

Installation guide available for download on our website.

REV 10.2023

RAYPA
Avinguda del Vallès, 322
08227 Terrassa (Barcelona) Spain
www.raypa.com